Practical Series

Practical PC

6th EDITION

Parsons & Oja

BookOnCD

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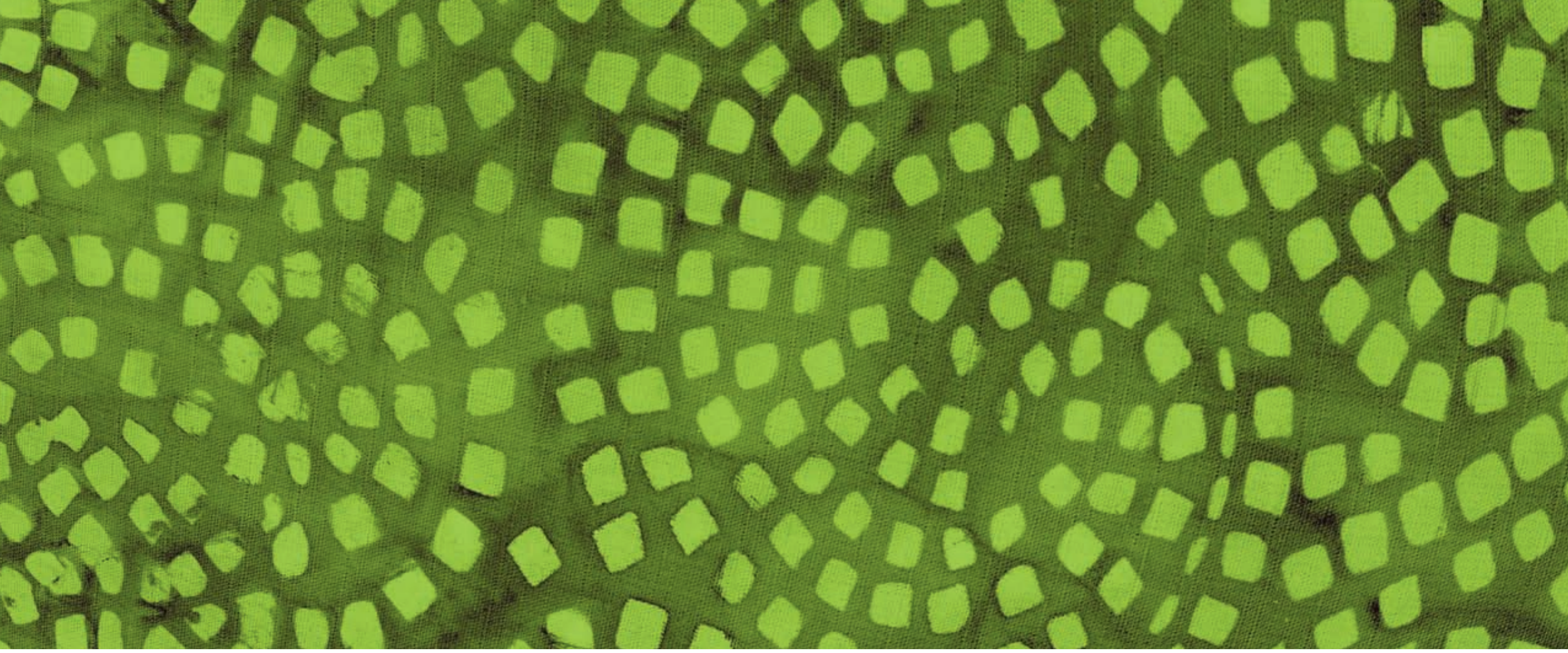

Practical PC
6th Edition

June Jamrich Parsons • Dan Oja

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Practical PC, 6th Edition

June Jamrich Parsons, Dan Oja

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Preface

About this book

At last, here is a book about the computers that people really use, with practical tips about how to use them. *Practical PC* provides a state-of-the-art introduction to Windows-based PCs, written in an easy-to-read style. In addition to the printed book, you receive a multimedia version of the entire textbook with videos and interactive elements such as pop-up definitions, software tutorials, and practice tests.

Each chapter of *Practical PC* focuses on a specific topic. The first page introduces the chapter topic, lists the chapter contents, and highlights BookOnCD media. Each chapter includes the following:

- **FAQs**, or "frequently asked questions," address key questions, provide background information, and give specific tips for becoming a more proficient computer user.
- A three-page **Hardware** section in each chapter explains the devices that are typically associated with the chapter topic.
- An **Issues** page highlights an ethical or cultural controversy that's relevant to the chapter topic.
- A **Project** shows you how to explore and apply the concepts presented in each chapter.
- A **QuickCheck** page contains self-test activities.

About the BookOnCD

Every book includes the innovative BookOnCD, which is loaded with features to enhance and reinforce learning.

PlayIt!	On the CD, the Play It! button makes figures come to life as videos that show you exactly how computer hardware components work.
TryIt!	Try It! buttons produce step-by-step interactive software tutorials, which give you a chance to quickly hone your software skills.
GetIt?	The Get It? button starts an interactive auto-graded practice test. Take a test more than once. Each test contains ten randomly selected questions from an extensive test bank. Results can be saved and delivered to an instructor.
What do you think?	Interactive "thought" questions focus on current ethical, social, and cultural computing issues. For the classroom, responses can be consolidated by instructors and displayed as pie charts.
QuickChecks	Interactive end-of-chapter QuickCheck questions provide instant feedback on what you've learned.
Pop-up Definitions & Glossary	Clickable boldface terms display pop-up definitions. A Glossary button provides easy access to all definitions from any page.

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Projects

Each chapter includes a Project section with step-by-step instructions for applying the concepts covered in the chapter.

Explore your computer
Explore the Windows desktop
Explore the user interface
Open and save files
Organize and find files
Explore file protection measures
Explore your Internet connection
Explore the Web
Explore e-mail
Explore word processing software
Explore spreadsheet software
Explore databases
Explore presentation software
Explore digital sound
Explore digital photos
Explore your media software
Find the technical specifications for your PC
Explore online computer stores
Explore technical support

Use this book because...

- **You want to learn about computers.** *Practical PC* will help you understand enough "tech talk" so you can decipher computer ads and hold your own when the conversation turns to computers.
- **You want to learn Windows.** *Practical PC* will show you how to use Windows controls and manage files so that you can use your computer to do neat stuff without frustration.
- **You want to learn how to use the Internet.** *Practical PC* will show you how to get connected, use a browser, send e-mail, and launch a search engine.
- **You want to find out what a computer can do for you.** You'll have a chance to experiment with all kinds of software applications, including software for word processing, art, video editing, music composition, and 3D graphics.
- **You are a beginner or an intermediate computer user.** *Practical PC* is great for beginners, but there's enough new and useful information to keep you interested even if you have some experience with PCs.

Teaching tools

With **ExamView**, our powerful testing software package, instructors can generate printed tests, create LAN-based tests, or test over the Internet.

An **Instructor's Manual** outlines each chapter, and provides valuable teaching tips and solutions for projects.

WebTrack is a versatile tool that provides automated delivery of tracking data from any student directly to the instructor with minimal setup or administrative overhead.

Acknowledgments

The successful launch of this book was possible only because of our extraordinary “ground crews.” We would like to extend our profound thanks:

To the instructors and reviewers for the Practical series who expressed their ideas and shared their teaching strategies with us. To the students at Northern Michigan University, the University of the Virgin Islands, and countless other universities who have participated in classes and corresponded with us over the 25 (or so) years since we began teaching.

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–June Jamrich Parsons and Dan Oja

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Before You Begin

You are going to enjoy using *Practical PC* and the accompanying BookOnCD. It's a snap to start the BookOnCD and use it on your computer. The answers to the FAQs (frequently asked questions) in this section will help you begin.

FAQ Will the BookOnCD work on my computer?

The easiest way to find out if the BookOnCD works on your computer is to try it! Just follow the steps below to start the CD. If it works, you're all set. Otherwise, check with your local technical support person.

To run the BookOnCD, your computer needs the Windows operating system, a CD or DVD drive, and screen resolution of 1024 x 768 or better. The CD works with Windows 7, XP, or Vista.

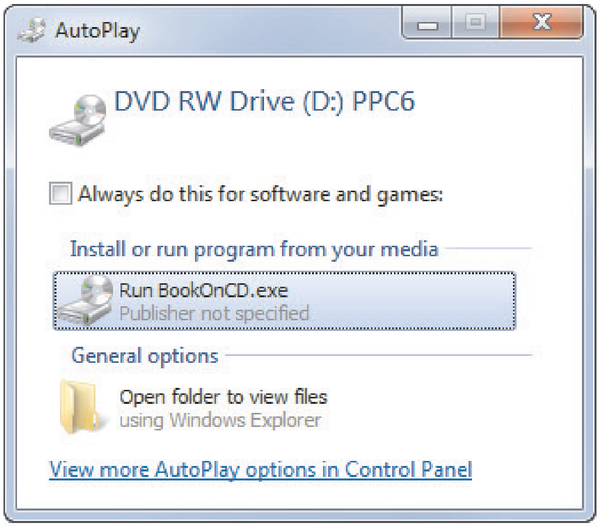
FAQ How do I start the BookOnCD?

The *Practical PC* BookOnCD is easy to use and requires no installation. Follow these simple steps to get started:

1. Make sure your computer is turned on.

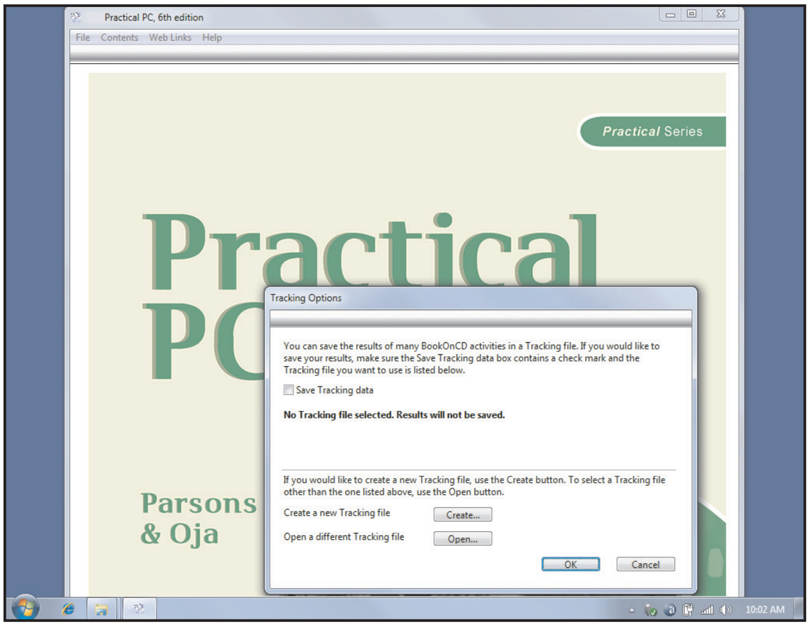
2. Insert the CD into your computer's CD/DVD drive. Once the CD is in the drive, you should hear the disc spinning in the drive.

3. If your computer displays an AutoPlay window similar to the one shown here, click the Run BookOnCD option.


AutoPlay
DVD RW Drive (D:) PPC6
☐ Always do this for software and games:
Install or run program from your media
Run BookOnCD.exe
Publisher not specified
General options
Open folder to view files
using Windows Explorer
View more AutoPlay options in Control Panel

4. When you see the screen below, the BookOnCD has started and is waiting for you to select tracking options. For information on tracking options, continue to the FAQ on the next page of your textbook.

The length of time your computer takes to start the BookOnCD depends on security settings. If you have security set to conduct a virus check on software running from CDs, you will have to wait for that process to be completed before the digital book opens.


Practical PC, 6th edition
File Contents Web Links Help
Practical Series
Practical PC
Parsons & Oja
Tracking Options
Create...
Open...
OK
Cancel
10:02 AM

You can save the results of many BookOnCD activities in a Tracking file. If you would like to save your results, make sure the Save Tracking data box contains a check mark and the Tracking file you want to use is listed below.

☐ Save Tracking data

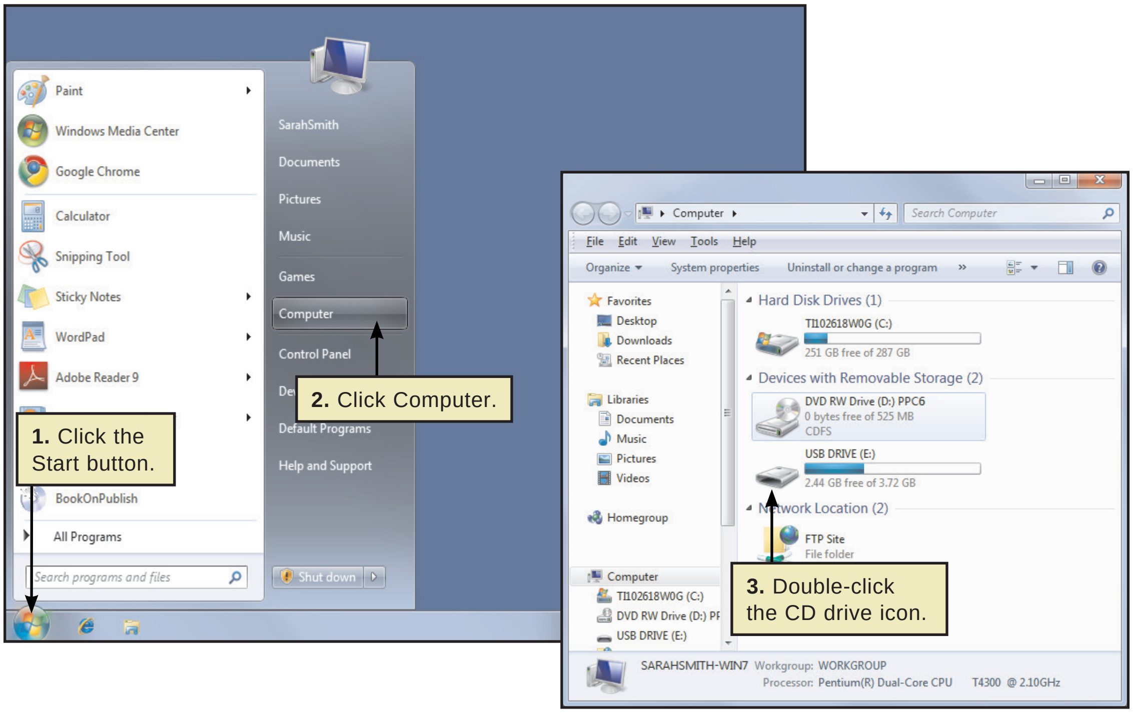
No Tracking file selected. Results will not be saved.

If you would like to create a new Tracking file, use the Create button. To select a Tracking file other than the one listed above, use the Open button.

Create a new Tracking file

Open a different Tracking file

Manual Start: Follow the instructions in this figure only if you've waited a minute or two and the Welcome screen has not appeared.


Paint
Windows Media Center
Google Chrome
Calculator
Snipping Tool
Sticky Notes
WordPad
Adobe Reader 9
BookOnPublish
All Programs
Search programs and files
SarahSmith
Documents
Pictures
Music
Games
Computer
Control Panel
Default Programs
Help and Support
Shut down
Computer
Search Computer
File Edit View Tools Help
Organize
System properties
Uninstall or change a program
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
TI102618W0G (C:)
DVD RW Drive (D:) PF
USB DRIVE (E:)
Hard Disk Drives (1)
TI102618W0G (C:)
251 GB free of 287 GB
Devices with Removable Storage (2)
DVD RW Drive (D:) PPC6
0 bytes free of 525 MB
CDFS
USB DRIVE (E:)
2.44 GB free of 3.72 GB
Network Location (2)
FTP Site
File folder
SARAHSMITH-WIN7 Workgroup: WORKGROUP
Processor: Pentium(R) Dual-Core CPU T4300 @ 2.10GHz

1. Click the Start button.

2. Click Computer.

3. Double-click the CD drive icon.

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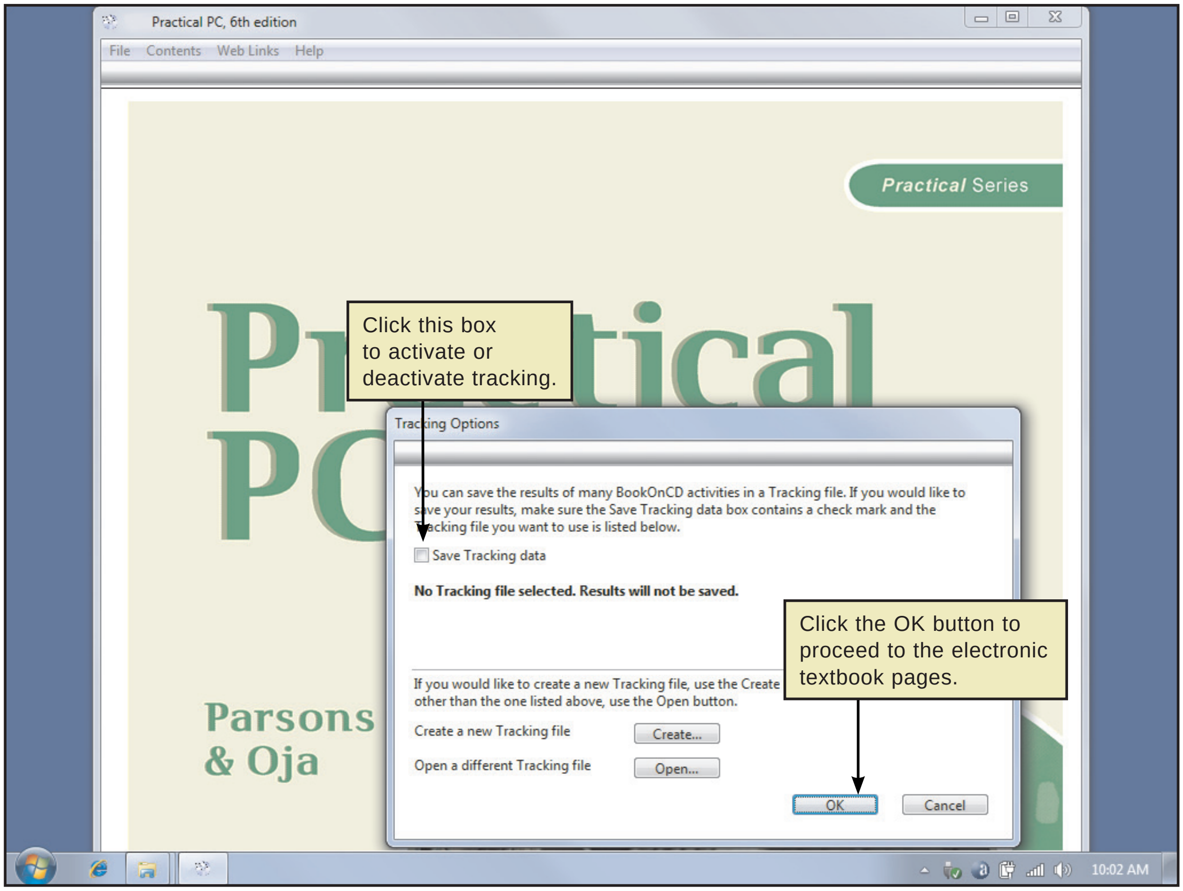
FAQ How should I set my tracking options?

When the BookOnCD starts, it displays the Practical PC title screen and a Tracking Options window. To proceed, you'll need to select your tracking settings.

A Tracking File records your progress by saving your scores on QuickChecks and practice tests at the end of each chapter. If you don't want to record your scores, simply make sure the *Save Tracking data* box is empty and then click the OK button to proceed straight to the first chapter.

Use the Tracking Options window to activate or deactivate tracking. You can also create a Tracking File or select a file as described below.



Click this box to activate or deactivate tracking.

You can save the results of many BookOnCD activities in a Tracking file. If you would like to save your results, make sure the Save Tracking data box contains a check mark and the Tracking file you want to use is listed below.

☐ Save Tracking data

No Tracking file selected. Results will not be saved.

If you would like to create a new Tracking file, use the Create
other than the one listed above, use the Open button.

Create a new Tracking file

Open a different Tracking file

Click the OK button to proceed to the electronic textbook pages.

If you prefer to track your scores, then you must create a Tracking File. It's easy! Click the Create button and then follow the on-screen prompts to enter your name, student ID, and class section.

When the Save As window appears, you can select the location for your Tracking File. If you are using your own computer, the default location in the Documents folder is a great place to store your Tracking File, so just click the Save button and you're all set!

If you are working on a public computer, such as one in a school lab, be aware that data stored on the hard disk might be erased or changed by other students unless you have a protected personal storage area. When working on a public computer or when you need to transport your data from one computer to another, a USB flash drive is a better option for storing your Tracking File.

To save your Tracking File in a location other than your computer's Documents folder, click the Computer icon and then double-click a storage location to select it. Click the Save button to finalize your storage selection.

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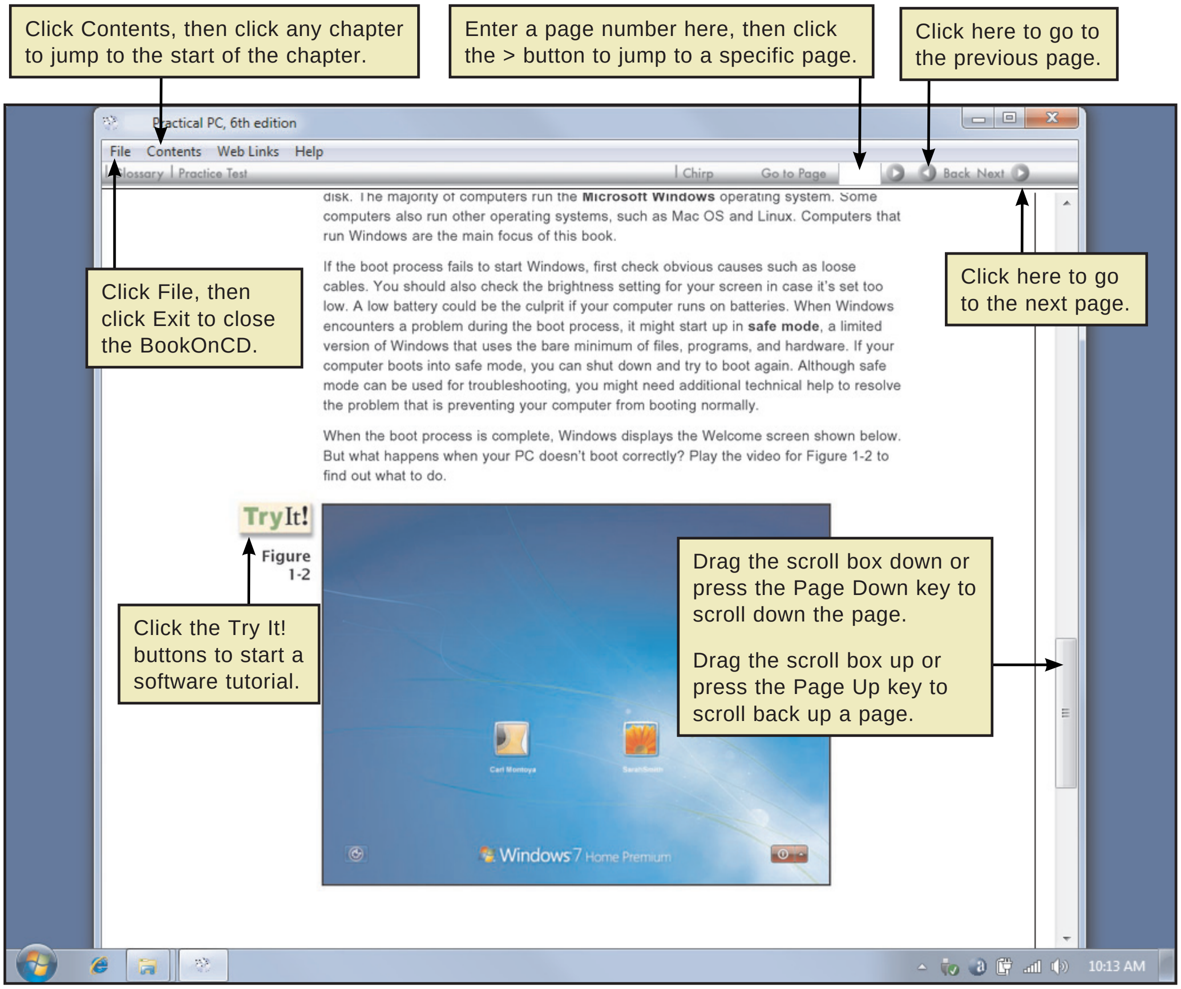
FAQ How do I navigate through the BookOnCD?

Each on-screen page exactly duplicates a page from the paper book. Use the mouse or the vertical scroll bar to scroll up and down the page.

Tools on the menu bar help you navigate from page to page. If your computer screen does not show an entire page, use the scroll bar.



Click Contents, then click any chapter to jump to the start of the chapter.

Enter a page number here, then click the > button to jump to a specific page.

Click here to go to the previous page.

Click File, then click Exit to close the BookOnCD.

Click here to go to the next page.

Click the Try It! buttons to start a software tutorial.

Drag the scroll box down or press the Page Down key to scroll down the page.

Drag the scroll box up or press the Page Up key to scroll back up a page.

disk. The majority of computers run the **Microsoft Windows** operating system. Some computers also run other operating systems, such as Mac OS and Linux. Computers that run Windows are the main focus of this book.

If the boot process fails to start Windows, first check obvious causes such as loose cables. You should also check the brightness setting for your screen in case it's set too low. A low battery could be the culprit if your computer runs on batteries. When Windows encounters a problem during the boot process, it might start up in **safe mode**, a limited version of Windows that uses the bare minimum of files, programs, and hardware. If your computer boots into safe mode, you can shut down and try to boot again. Although safe mode can be used for troubleshooting, you might need additional technical help to resolve the problem that is preventing your computer from booting normally.

When the boot process is complete, Windows displays the Welcome screen shown below. But what happens when your PC doesn't boot correctly? Play the video for Figure 1-2 to find out what to do.

FAQ What should I know about the Projects?

The Project section at the end of each chapter helps you consolidate and apply the concepts presented in the chapter. All projects require the Windows 7 operating system. Other software and storage media that you'll need for a project are listed at the beginning of the section.

If a project requires you to send an e-mail attachment to your instructor, use your usual e-mail software, such as Thunderbird, Microsoft Outlook, Windows Live Mail, Hotmail, Eudora, Gmail, or AOL mail. (If you don't have an e-mail account, see Chapter 9 for instructions on how to set one up.) First make sure that you have saved the project file. Next, start your e-mail software. Then, follow your software's procedures for sending an e-mail attachment.

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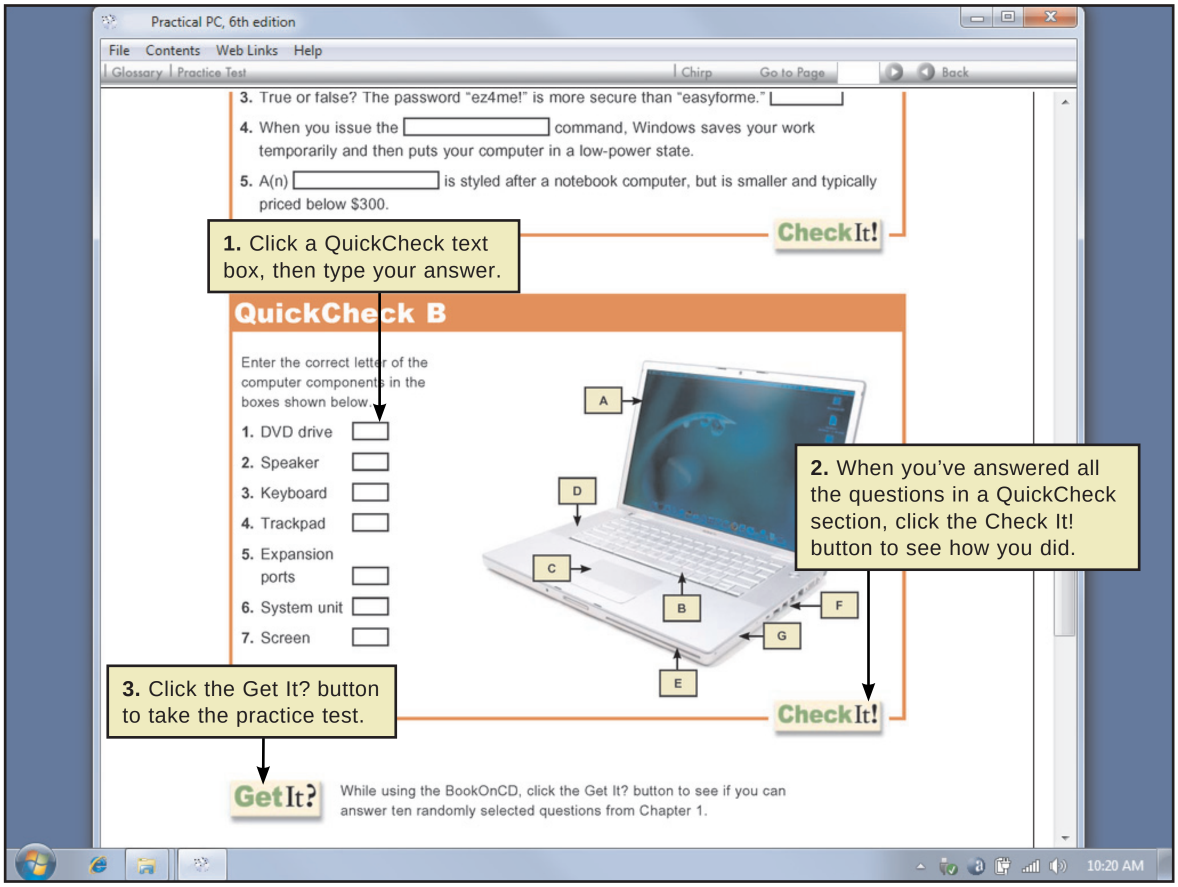
FAQ How does the interactive assessment page work?

Each chapter ends with an assessment page containing interactive activities. You can use these activities to evaluate how well you've mastered the concepts and skills covered in the chapter. If you do well on the QuickChecks and practice tests, then you're ready to move on to the next chapter. If you don't do well, you might want to review the material before continuing to the next chapter.

QuickChecks and practice tests are computer-scored activities that help you assess your understanding of chapter material.



3. True or false? The password "ez4me!" is more secure than "easyforme." ☐

4. When you issue the ☐ command, Windows saves your work temporarily and then puts your computer in a low-power state.

5. A(n) ☐ is styled after a notebook computer, but is smaller and typically priced below $300.

1. Click a QuickCheck text box, then type your answer.

Enter the correct letter of the computer components in the boxes shown below.

1. DVD drive ☐
2. Speaker ☐
3. Keyboard ☐
4. Trackpad ☐
5. Expansion ports ☐
6. System unit ☐
7. Screen ☐

2. When you've answered all the questions in a QuickCheck section, click the Check It! button to see how you did.

3. Click the Get It? button to take the practice test.

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 1.

FAQ Are all my scores tracked?

Your scores on QuickChecks and practice tests are tracked if you have activated tracking with a check mark in the Save Tracking data box.

FAQ How can I change tracking?

You can access the Tracking Options window at any time by clicking File on the menu bar and selecting Change Tracking Options. When the Tracking Options window appears, you can activate or deactivate tracking, create a new Tracking File, or select a different Tracking File.

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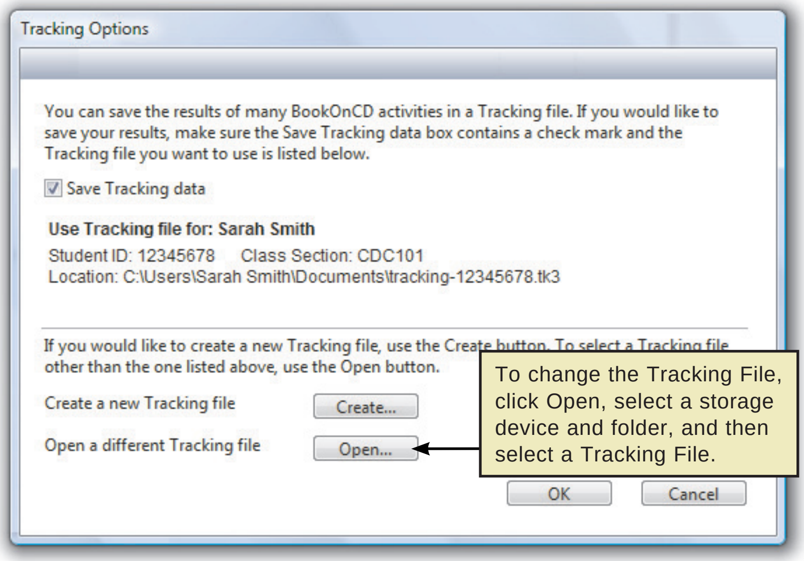
FAQ What if the Tracking Options window shows the wrong Tracking File?

When working in a computer lab or using a computer where other students are using the BookOnCD, the Tracking Options window might show the name of a Tracking File that belongs to another person because that person was the last one to use the computer. You can use the Open button on the Tracking Options window to select a different Tracking File.

You can select a different Tracking File if the one displayed is not yours. Tracking files are usually stored in the Documents folder.



Tracking Options

You can save the results of many BookOnCD activities in a Tracking file. If you would like to save your results, make sure the Save Tracking data box contains a check mark and the Tracking file you want to use is listed below.

☑ Save Tracking data

Use Tracking file for: Sarah Smith

Student ID: 12345678 Class Section: CDC101

Location: C:\Users\Sarah Smith\Documents\tracking-12345678.tk3

If you would like to create a new Tracking file, use the Create button. To select a Tracking file other than the one listed above, use the Open button.

Create a new Tracking file

Open a different Tracking file

To change the Tracking File, click Open, select a storage device and folder, and then select a Tracking File.

FAQ How do I submit my Tracking File?

In an academic setting, your instructor might request your Tracking File data to monitor your progress. Your instructor will tell you if you should submit your Tracking File using the WebTrack system, if you should hand in your entire Tracking File, or if you should send the Tracking File as an e-mail attachment.

FAQ How do I end a session?

You will need to leave the BookOnCD disc in the CD drive while you're using it, or you will encounter an error message. Before you remove the CD from the drive, you must exit the program by clicking File on the BookOnCD menu bar, then clicking Exit. You can also exit by clicking the Close button in the upper-right corner of the window.

FAQ What about sound?

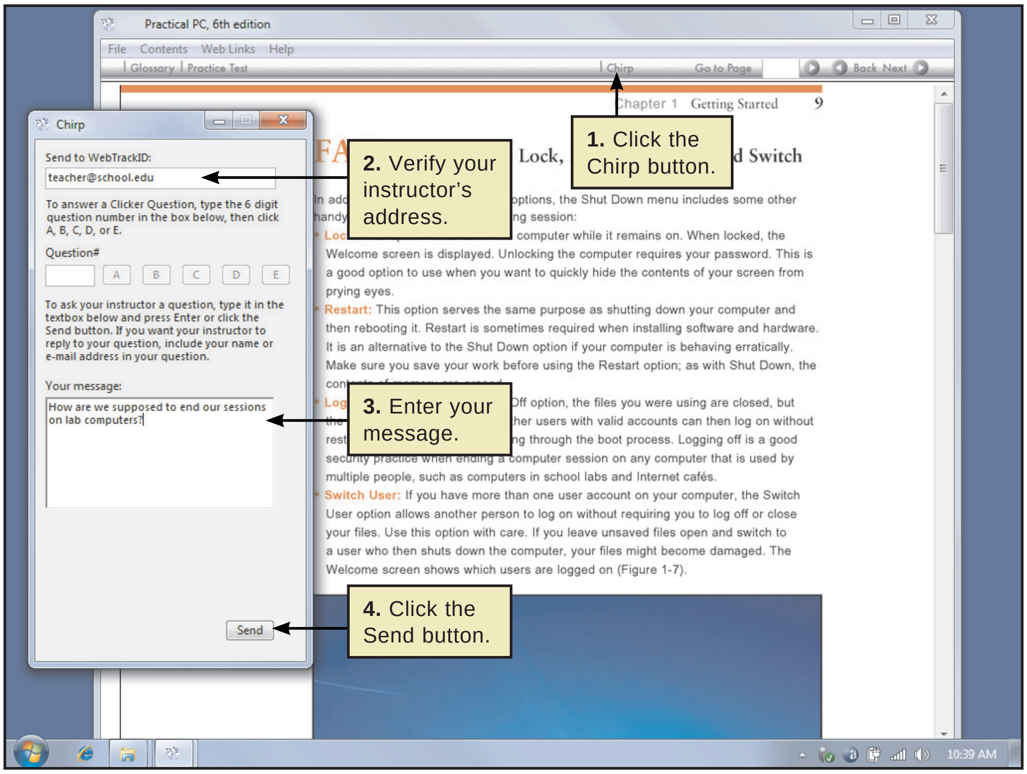
If your computer is equipped for sound, you should hear the audio during the screen tours and interactive simulations. If you don't hear anything, check the volume control on your computer by clicking the speaker icon in the lower-right corner of your screen. If you're working in a lab or office where sound would be disruptive, consider using headphones.

FAQ Which version of Windows do I need?

You can run the BookOnCD and use all of the tutorials if your computer runs Windows 7, XP, or Vista. Regardless of the operating system installed on your computer, however, the simulated screens you see when working with the tutorials all display Windows 7.

FAQ What are chirps?

A chirp is a short message, similar to a Twitter-style tweet. You can use chirps to send questions about the material in the textbook to your instructor. To use chirps, click the Chirp button on the navigation bar. Make sure your instructor's WebTrack address is correct, then enter your message in the box provided. Click the Send button and your chirp will be on its way.



Send to WebTrackID: teacher@school.edu

To answer a Clicker Question, type the 6 digit question number in the box below, then click A, B, C, D, or E.

To ask your instructor a question, type it in the textbox below and press Enter or click the Send button. If you want your instructor to reply to your question, include your name or e-mail address in your question.

Your message: How are we supposed to end our sessions on lab computers?

Welcome screen is displayed. Unlocking the computer requires your password. This is a good option to use when you want to quickly hide the contents of your screen from prying eyes.

Restart: This option serves the same purpose as shutting down your computer and then rebooting it. Restart is sometimes required when installing software and hardware. It is an alternative to the Shut Down option if your computer is behaving erratically. Make sure you save your work before using the Restart option; as with Shut Down, the

multiple people, such as computers in school labs and Internet cafés.

Switch User: If you have more than one user account on your computer, the Switch User option allows another person to log on without requiring you to log off or close your files. Use this option with care. If you leave unsaved files open and switch to a user who then shuts down the computer, your files might become damaged. The Welcome screen shows which users are logged on (Figure 1-7).

1. Click the Chirp button.

2. Verify your instructor's address.

3. Enter your message.

4. Click the Send button.

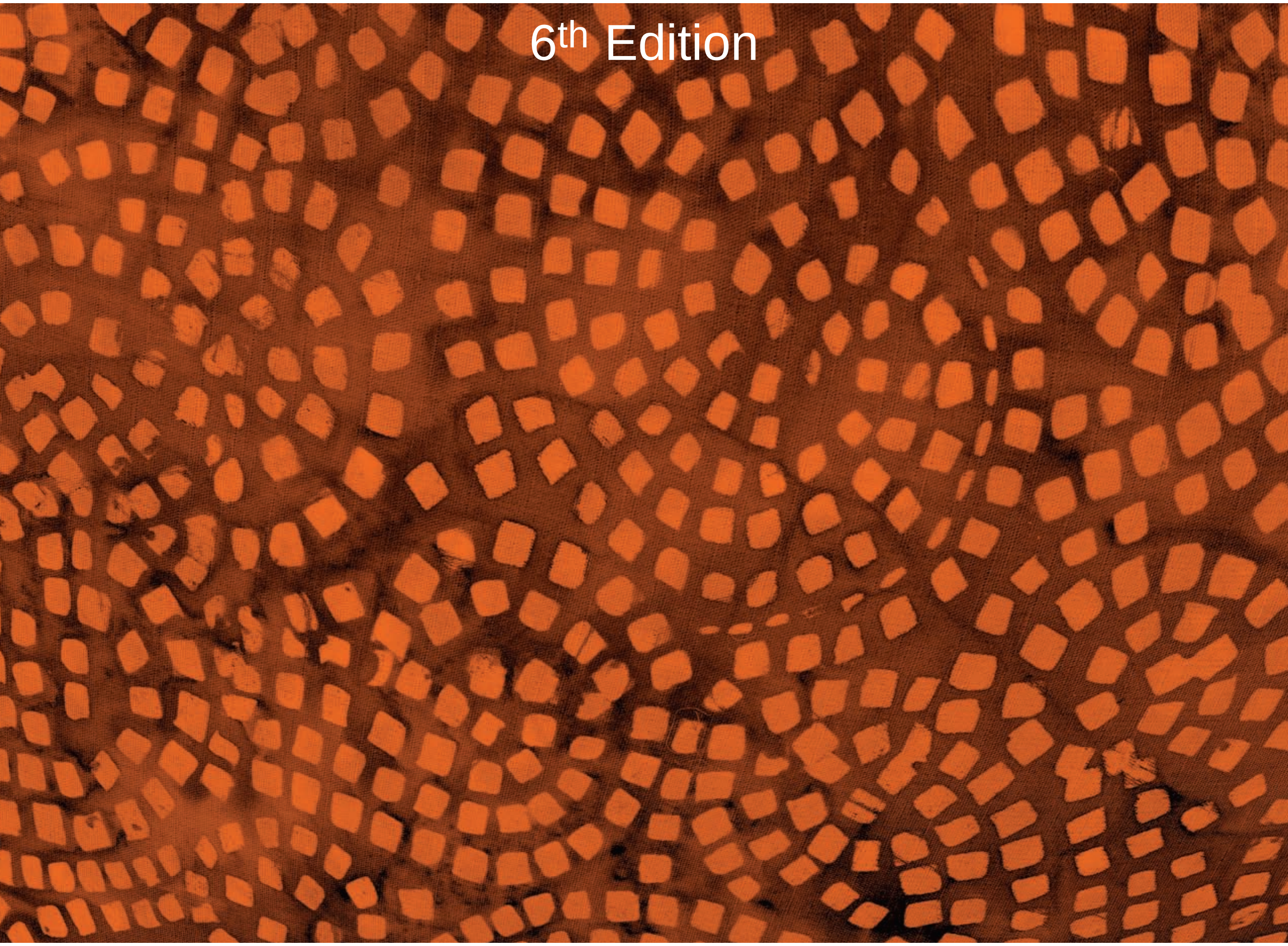
FAQ How do I get the most out of the book and the BookOnCD?

If you have your own computer, you might want to start the CD and do your own reading online. You'll then be able to click the Try It! and Play It! buttons as you come to them and click boldface terms to see pop-up definitions. Also, you'll be able to immediately interact with the Issues and QuickCheck sections, and practice tests at the end of each chapter.

If you do not have a computer, you should read through the chapter in the book. Later, when it is convenient, take your BookOnCD to a computer at school, home, or work and browse through the chapter, clicking each Play It! activity. After you view the videos, you can jump to the Issues, QuickCheck sections, and practice tests and complete those interactive activities. You can also do the projects by following the step-by-step instructions in the Project section.

Take your time. You might want to do each chapter in two sessions by first reading the FAQ (frequently asked question), Hardware, and Issues sections. Then, in a later session, you can complete the Projects, QuickCheck sections, and practice tests.

Practical PC



6th Edition

CHAPTER 1

Getting Started

What's Inside?

Chapter 1 provides an overview of your computer system, including the terminology and equipment you need to get started. Some of the material might be a review, but don't ignore the explanations that tell you *why* these things work the way they do.

- **FAQs:**
  - Where's the power switch? 3
  - What is the boot process? 4
  - What is a user account? 5
  - What if my computer asks me for a password? 6
  - How do I turn off my computer? 7
  - When should I use sleep and hibernate modes? 8
  - What about the Lock, Restart, Log Off, and Switch User options? 9
- **Hardware:** Desktops, notebooks, tablets, and netbooks 10
- **Project:** Explore your computer 13
- **Issue:** Is the digital divide growing? 16
- **QuickChecks** 17

What's on the CD?

Your BookOnCD contains the entire text of the printed book. But that's not all! On the CD, the figures "come to life" through videos and animations. To use the CD, simply insert it into your CD or DVD drive. After a few seconds, you should see the title page and the Tracking Options window. For more information about using the CD, refer to the Before You Begin section in the front of the book.

- Find out what goes on during the boot process 4
- Learn how to modify your user account 5
- Discover how to close non-responding programs 7
- Experiment with sleep and hibernate modes 8

FAQ Where's the power switch?

The power switch is located on your computer's **system unit**, the case that holds many important hardware components. Most power switches are labeled with a ⏻ symbol, and power lights indicate whether your computer is on or off. Your **PC** (personal computer) is a collection of hardware and software components that help you accomplish many different tasks. As you probably know, a computer and any equipment connected to it are called **hardware**. A set of instructions that a computer follows to perform a task is called a computer program or **software**.

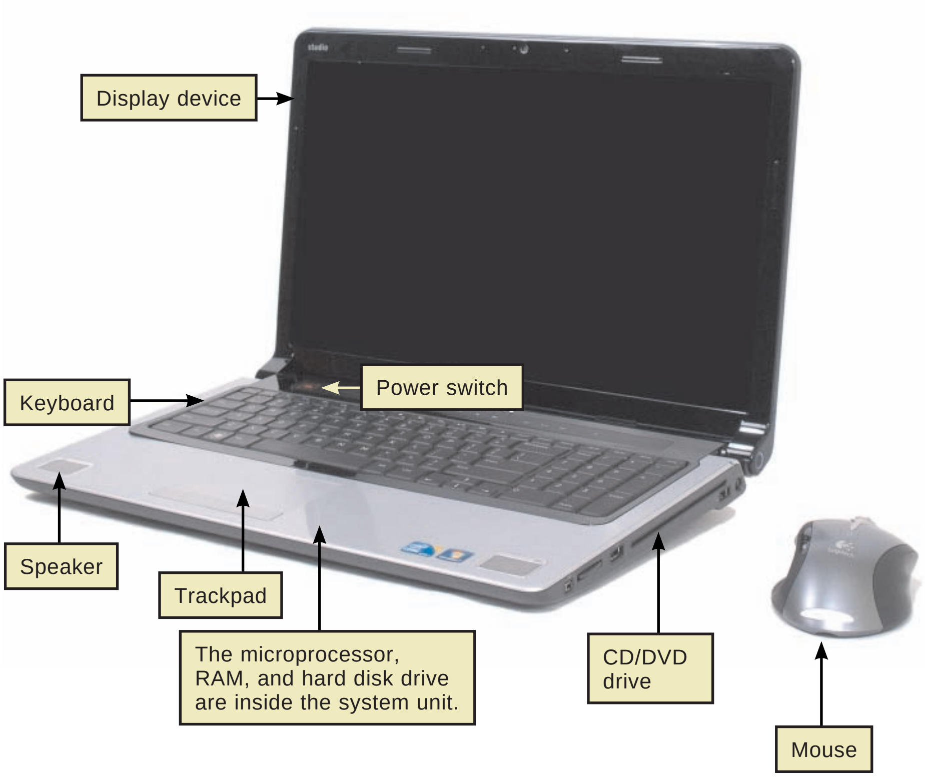
PCs include several important components to process, store, collect, and output data. The **microprocessor** is essentially the brain of the computer, which carries out commands you issue when creating documents, drawing pictures, or manipulating numbers. It works with **data** that represents words, numbers, and pictures. This data is held temporarily in memory chips called **RAM** (random access memory).

Data has a more permanent home on **storage media** such as hard disks, USB flash drives, CDs, and DVDs. Devices that are designed to store data on disks and other storage media are referred to as **storage devices**. The main storage device for most PCs is a high-capacity **hard disk drive** located inside the system unit.

The capacity of storage devices is measured in megabytes, gigabytes, or terabytes. A **megabyte** (MB) stores approximately a million characters of data, a **gigabyte** (GB) stores a billion characters, and a **terabyte** (TB) stores a trillion characters.

Computers also include **input devices**, such as keyboards, mice, and trackpads, that you use to enter data for processing. **Output devices**, such as printers and display screens, show the results of processing. Figure 1-1 illustrates basic hardware components of a typical PC.

Figure 1-1


Display device
Keyboard
Power switch
Speaker
Trackpad
The microprocessor, RAM, and hard disk drive are inside the system unit.
CD/DVD drive
Mouse

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FAQ What is the boot process?

As soon as you switch on the power, your PC starts to “boot up.” During the **boot process**, the PC performs diagnostic tests to make sure that the keyboard, storage devices, RAM, and microprocessor are functioning correctly. After testing the hardware, the boot program looks for the operating system. The **operating system** is software that manages a computer’s internal operations and defines how you interact with the computer. You can use the operating system to organize your files or start **application software** that helps you produce documents, make calculations, draw pictures, or maintain your to-do list.

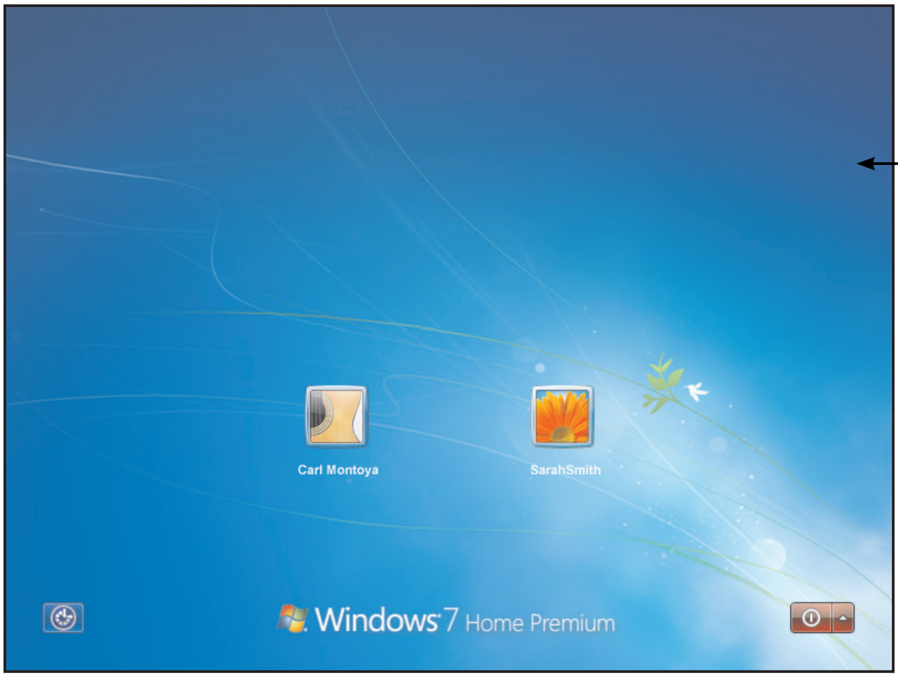
Today’s computers typically come with the operating system preinstalled on the hard disk. The majority of computers run the **Microsoft Windows** operating system. Some computers also run other operating systems, such as Mac OS and Linux. Computers that run Windows are the main focus of this book.

If the boot process fails to start Windows, first check obvious causes such as loose cables. You should also check the brightness setting for your screen in case it’s set too low. A low battery could be the culprit if your computer runs on batteries. When Windows encounters a problem during the boot process, it might start up in **safe mode**, a limited version of Windows that uses the bare minimum of files, programs, and hardware. If your computer boots into safe mode, you can shut down and try to boot again. Although safe mode can be used for troubleshooting, you might need additional technical help to resolve the problem that is preventing your computer from booting normally.

When the boot process is complete, Windows displays the Welcome screen shown below. But what happens when your PC doesn’t boot correctly? Play the video for Figure 1-2 to find out what to do.

Try It!

Figure 1-2



Welcome screen

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FAQ What is a user account?

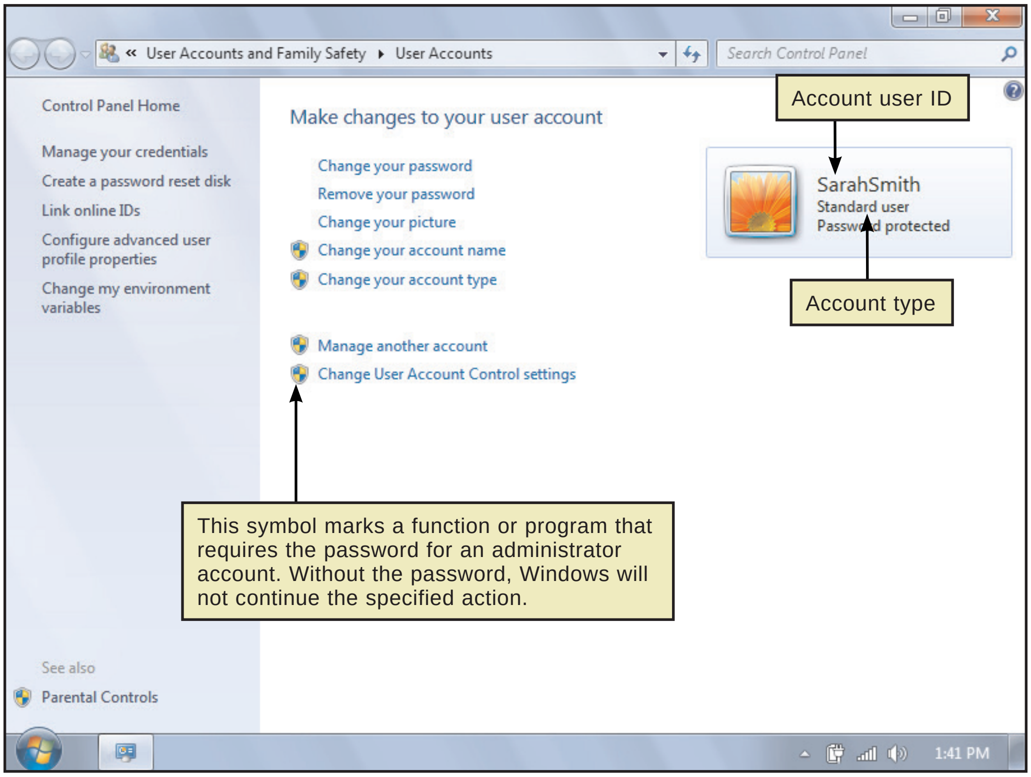
After a successful boot, you'll see the Welcome screen, which allows you to select a user account and log in to Windows. Your **user account** is associated with information that determines which files you can access and which settings you are allowed to change on your computer. Computers can have more than one user account. Each one is identified by a user ID (also called a user name).

There are three types of user accounts: administrator, standard, and guest. An **administrator account** has access to all computer files and settings. A **standard account** is best for routine activities such as word processing, e-mailing, and browsing the Web. When you use a standard account, Windows requires you to provide a valid password for an administrator account before it allows you to perform tasks such as installing software and changing security settings, which affect other users. A **guest account** is set up only for temporary use of a computer and has limited access to files and programs. Students who use computers in labs are usually assigned standard or guest accounts.

Although Windows documentation recommends that you use a standard account for most daily computing activities, you might find it more convenient to use an administrator account if you are the only user on your computer. You can access and modify your account settings by clicking the picture for your account displayed at the top of the Start menu. Click the Try It! button in Figure 1-3 to find out how you can modify your account information.

TryIt!

Figure 1-3


« User Accounts and Family Safety ▸ User Accounts
Search Control Panel
Control Panel Home
Manage your credentials
Create a password reset disk
Link online IDs
Configure advanced user profile properties
Change my environment variables
Make changes to your user account
Change your password
Remove your password
Change your picture
Change your account name
Change your account type
Manage another account
Change User Account Control settings
SarahSmith
Standard user
Password protected
See also
Parental Controls
1:41 PM

Account user ID

Account type

This symbol marks a function or program that requires the password for an administrator account. Without the password, Windows will not continue the specified action.

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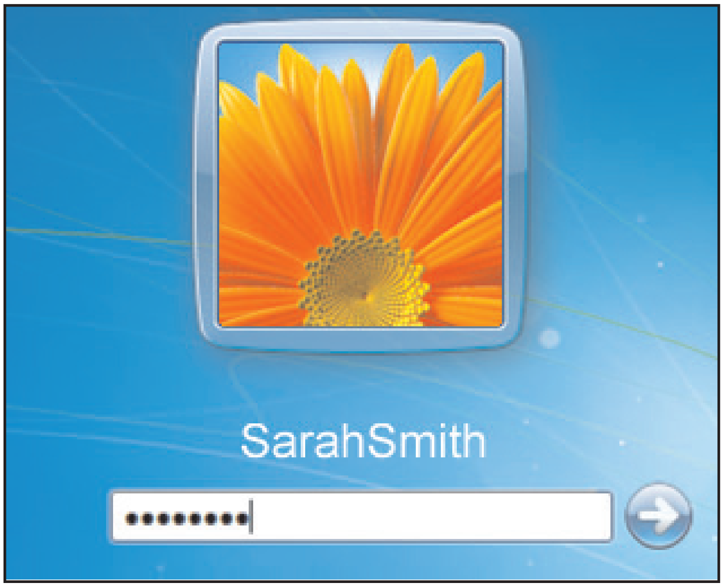
FAQ What if my computer asks me for a password?

A **password** is a series of letters and numbers associated with a user ID. Entering the password that corresponds to a user ID allows access to the user account. Your Windows password is a series of letters and numbers that provides security clearance for the use of your computer. An administrator account requires a password. Standard and guest accounts are not required to have passwords, but most experts recommend using passwords for all accounts to prevent unauthorized access to a computer's files and settings.

When you type your password, it usually appears as a series of dots as shown in Figure 1-4. This security measure hides your password from anyone who might be looking over your shoulder.

Figure 1-4



When you create or modify your password, select one that is difficult for someone else to guess. A secure password is sometimes referred to as a "strong" password. You should avoid the following passwords:

- Public information that anyone can look up easily, such as your name, relative's name, birth date, telephone number, Social Security number, or pet's name.
- Passwords containing all or part of your user ID. For example, a user ID of MJones should not have a corresponding password like MJones468.
- Words that can be found in the dictionary, including foreign words. A common way of "breaking" or discovering a password is to run through an electronic dictionary, trying all the words it contains. Even words spelled backwards, such as drowssap for "password," are considered weak passwords.
- Those that have entire words embedded in them, such as iforgot.

Strong passwords are at least eight characters long. You can combine uppercase and lowercase letters, numbers, and special symbols like @, #, and %. You can create a fairly secure password by replacing some of the letters with numbers and symbols in an easy-to-remember phrase such as MyP@ssw0rd. You can also create a password using the first letters of a verse from a favorite song or poem. Using the verse, "Humpty Dumpty sat on a wall," you can create *HDsoaw* as your password. Note that Windows allows spaces in passwords, but many other applications and Web sites do not.

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FAQ How do I turn off my computer?

When you've completed a computing session, you might be tempted to simply hold down the power switch until the computer turns off. If you do so, however, your files might not close properly before the data in memory disappears when the power is cut. Instead of pressing the power switch, you should turn your computer off by clicking the Shut Down option, located on the Windows Start menu. The **shut down** procedure ensures that all your files are properly closed so that no data is lost when the computer powers down and the data in RAM is blanked out.

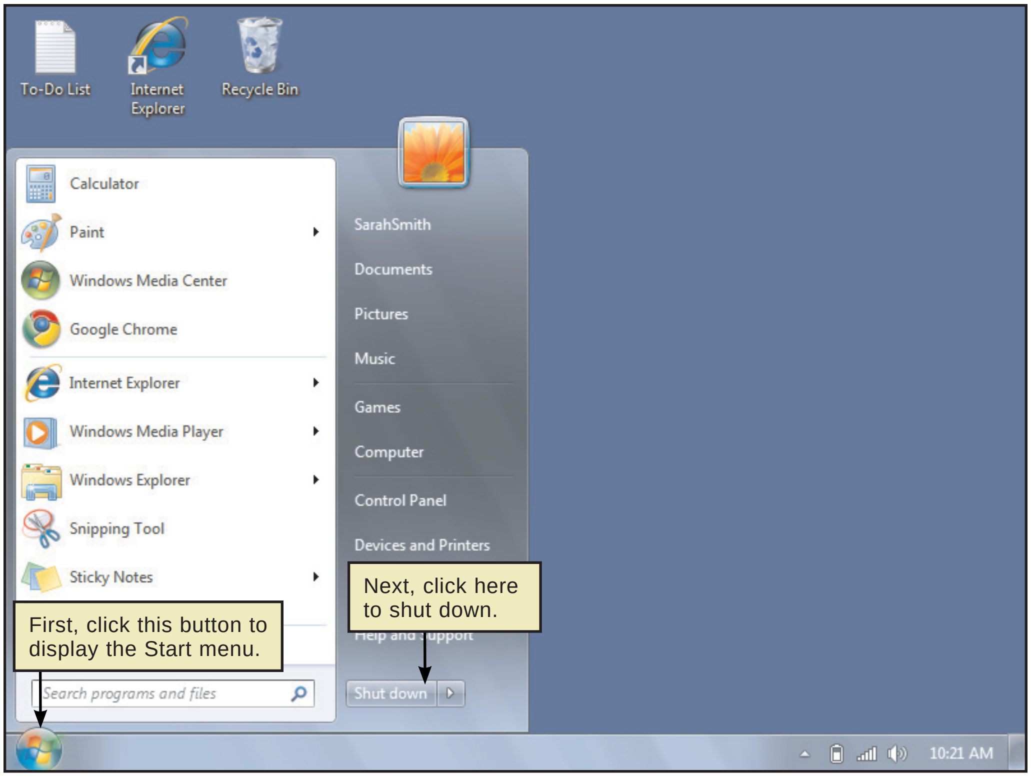
If occasionally you forget to use the shut down procedure, don't panic. Many types of application software, such as word processors, have autosave routines that can restore files that might not have closed properly. The risk of losing data is there, however, so use the shut down procedure whenever possible.

You should shut down your computer when you don't intend to use it for several days. Shutting down is the best way to conserve power and prevent battery drain. You should always use the shut down procedure before unplugging a non-battery-powered computer. You can also use the Shut Down option if Windows starts to behave erratically. Rebooting often resolves such problems because it reloads the operating system.

Computer software sometimes has "bugs" or errors that cause your computer to "freeze up" or "hang" so you can't access the Shut Down option. Before you press the power switch, try holding down the Ctrl, Shift, and Esc keys at the same time. This key combination opens the Windows Task Manager, which enables you to close any non-responding programs. If only one program has frozen, you'll normally be able to close that program. You can then retry the Shut Down option to see if it works correctly.

Figure 1-5 shows how to use the Shut Down option. Click the Try It! button to find out how to use the Task Manager if a program is not responding.

Figure 1-5


To-Do List
Internet Explorer
Recycle Bin
Calculator
Paint
Windows Media Center
Google Chrome
Internet Explorer
Windows Media Player
Windows Explorer
Snipping Tool
Sticky Notes
Search programs and files
SarahSmith
Documents
Pictures
Music
Games
Computer
Control Panel
Devices and Printers
Help and Support
Shut down
10:21 AM

First, click this button to display the Start menu.

Next, click here to shut down.

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FAQ When should I use sleep and hibernate modes?

When you power up your computer after you've shut it down, you have to wait for the lengthy boot process to be completed. You also have to manually reopen all programs and files that you want to work with. Hibernate and sleep modes enable you to resume your work where you left off without having to wait for the boot process. When your computer is in these modes, you can wake it up by opening the lid, pressing a key, or moving the mouse.

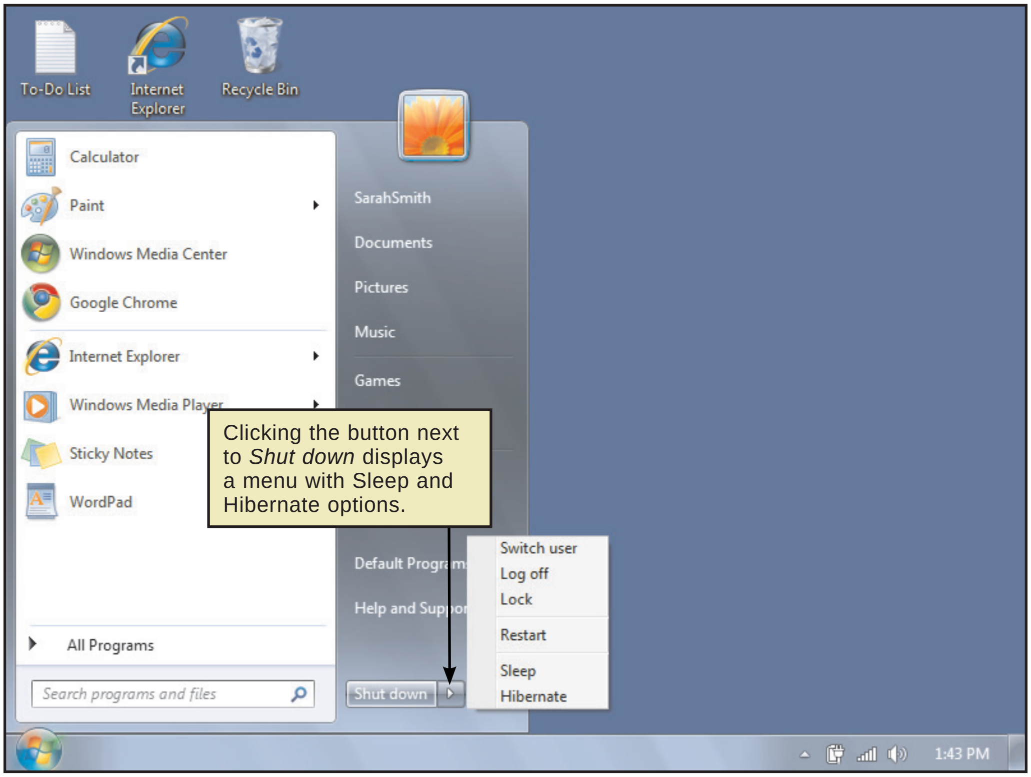
When you put your computer into **sleep mode**, Windows keeps all your work in memory and puts your computer in a low-power, energy-saving state. Sleep mode is a good option if you use your computer intermittently throughout the day. Password-protecting your account will ensure that your files are inaccessible to unauthorized people who wake up your computer.

When you put your computer into **hibernate mode**, Windows saves all your work to your hard disk and turns off your computer, but still remembers what you were working on the next time you start a new session. Hibernate uses slightly less power than sleep mode, but it takes a bit longer to get all your files and programs loaded up.

There are several ways to put your computer into sleep or hibernate modes; you can shut the lid of a portable computer, you can briefly press the power switch, or you can use options on the Shut Down menu. Your computer might automatically go into sleep mode after a period of inactivity. These modes are fully customizable using Power Options settings. For example, you can set your computer to automatically go into sleep mode after 15 minutes of inactivity or if you shut the lid, but go into hibernate mode if you briefly depress the power switch. Figure 1-6 shows how to access the sleep and hibernate options from the Start menu; the Try It! button shows you how to customize Power Options.

Try It!

Figure 1-6


To-Do List
Internet Explorer
Recycle Bin
Calculator
Paint
Windows Media Center
Google Chrome
Internet Explorer
Windows Media Player
Sticky Notes
WordPad
All Programs
Search programs and files
SarahSmith
Documents
Pictures
Music
Games
Default Programs
Help and Support
Shut down
Switch user
Log off
Lock
Restart
Sleep
Hibernate
1:43 PM

Clicking the button next to *Shut down* displays a menu with Sleep and Hibernate options.

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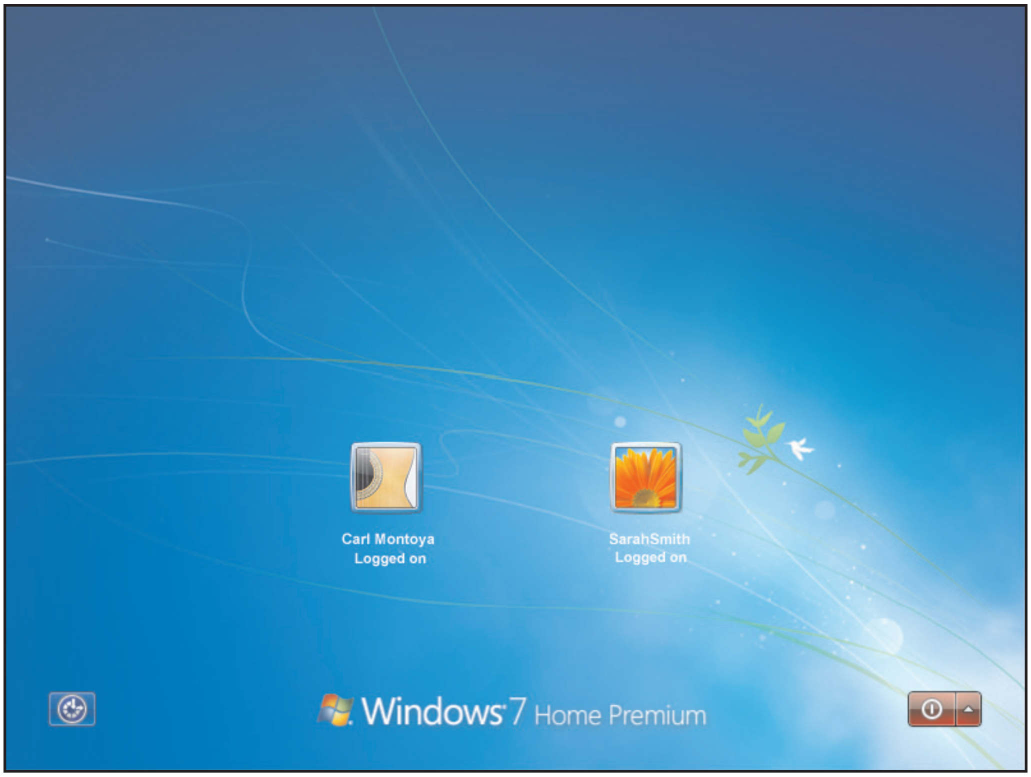
FAQ What about the Lock, Restart, Log Off, and Switch User options?

In addition to Sleep and Hibernate options, the Shut Down menu includes some other handy options for ending a computing session:

- **Lock:** This option locks down the computer while it remains on. When locked, the Welcome screen is displayed. Unlocking the computer requires your password. This is a good option to use when you want to quickly hide the contents of your screen from prying eyes.
- **Restart:** This option serves the same purpose as shutting down your computer and then rebooting it. Restart is sometimes required when installing software and hardware. It is an alternative to the Shut Down option if your computer is behaving erratically. Make sure you save your work before using the Restart option; as with Shut Down, the contents of memory are erased.
- **Log Off:** When you use the Log Off option, the files you were using are closed, but the computer is not turned off. Other users with valid accounts can then log on without restarting the computer and waiting through the boot process. Logging off is a good security practice when ending a computer session on any computer that is used by multiple people, such as computers in school labs and Internet cafés.
- **Switch User:** If you have more than one user account on your computer, the Switch User option allows another person to log on without requiring you to log off or close your files. Use this option with care. If you leave unsaved files open and switch to a user who then shuts down the computer, your files might become damaged. The Welcome screen shows which users are logged on (Figure 1-7).

Figure 1-7



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Hardware

Desktops, notebooks, tablets, and netbooks

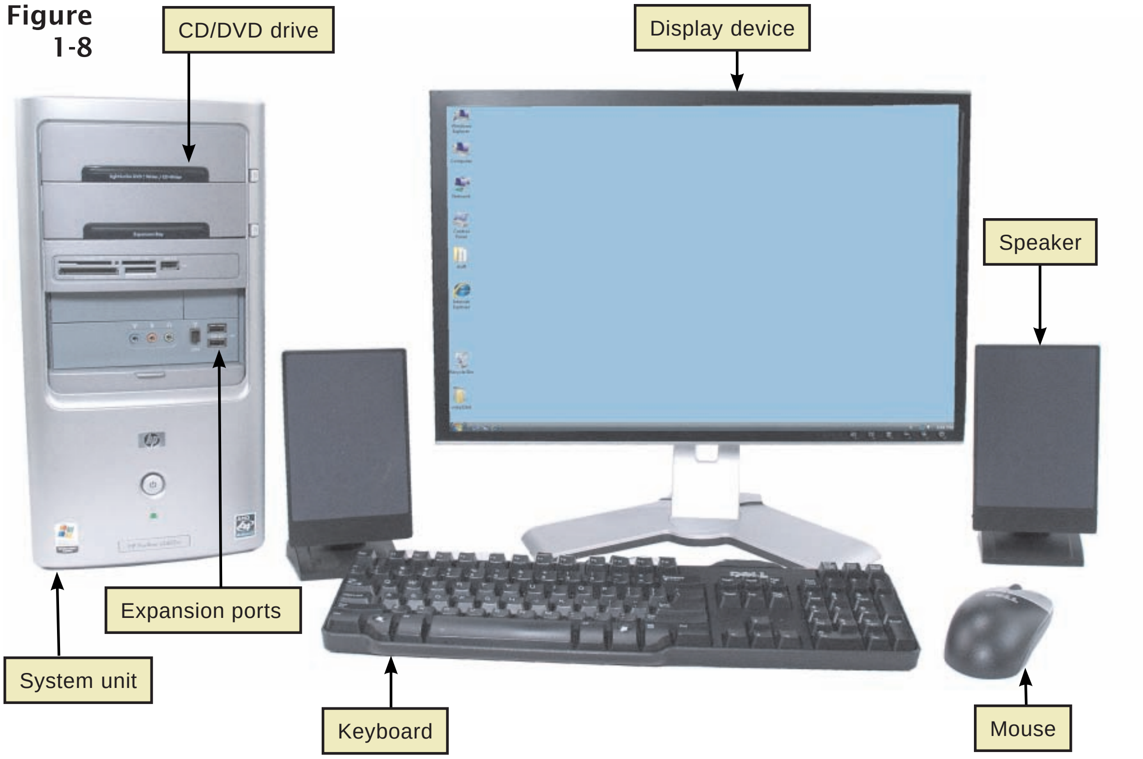
The term **computer system** usually refers to a computer and all the components that are connected to it, such as a mouse, a printer, a scanner, and any external storage devices. At the core of a computer system is the computer itself, which can come in several configurations that fit on your desk or in your backpack. Each has advantages—you might find that you need more than one computer!

A **desktop computer** is designed to be a fairly permanent fixture on your desk. Key hardware components include the system unit, mouse, keyboard, and display device. You'll tend not to move a desktop computer very frequently because it takes some time to disconnect and then reconnect all the components. In addition, it requires power from a wall outlet. The system unit might be fairly heavy, so you don't want to tote it around unnecessarily.

Although they are rather large and not very portable, desktop computers provide the most expansion capability and the most computing power for your dollar. You can purchase a very serviceable desktop computer with a basic set of software tools for less than US$500, although a high-performance computer with the latest processor and components can cost as much as US$5,000.

Many desktop computers are housed in a large, vertical **tower case**, which offers space inside for adding expansion cards and additional storage devices. Most desktop computer system units also provide several **expansion ports** that can be used to connect external devices. As shown in Figure 1-8, in a desktop computer, the system unit, display device, and keyboard are usually separate components. Additional devices can be added using cable connections or wireless signals.

Figure 1-8



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Hardware
(continued)

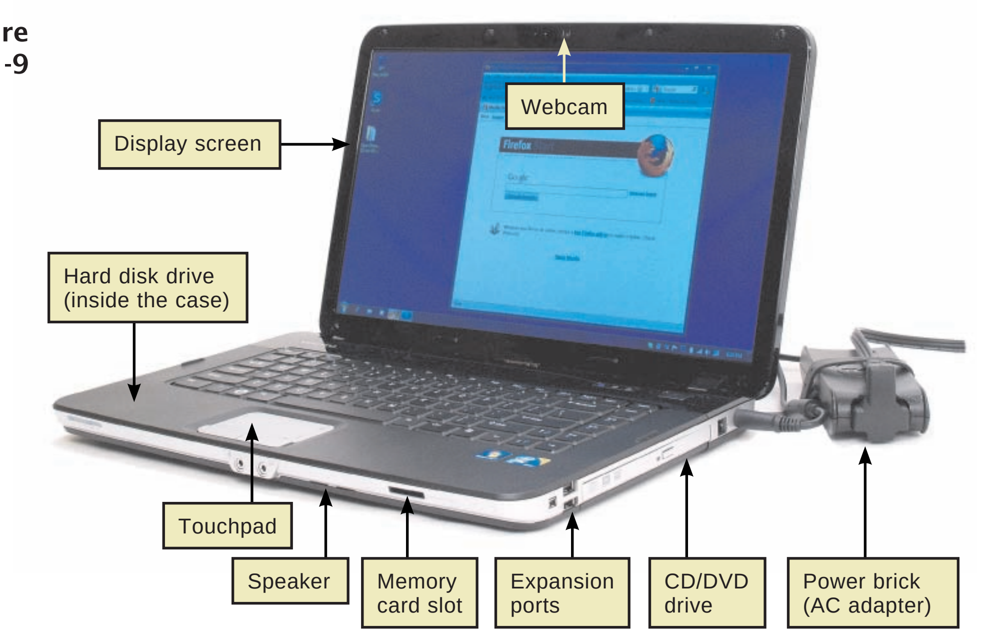
Notebook computers, sometimes called laptops, are designed for people on the move. All the essential components—keyboard, screen, pointing device, expansion ports, and storage devices—are housed in a single unit. Notebook computers typically include a built-in trackpad that takes the place of a mouse for pointing and clicking. You can plug a notebook computer into a wall outlet or run it from special battery packs that last two to five hours on a single charge.

A notebook and its battery typically weigh between four and ten pounds. However, when you pack a carrying case with a notebook computer and all the paraphernalia needed for computing, you may have 8 to 15 pounds to lug around. Adding substantially to the weight is the **AC adapter** or “power brick,” which allows you to plug the notebook into a wall outlet to recharge the battery. Most ads for notebook computers omit this important piece of gear from photos and weight specifications.

Compared with a desktop computer, a notebook provides less computing power for your dollar because you are paying for portability. Notebook computers typically cost between US$500 and US$4,000, and you can expect to pay at least US$700 for an average notebook.

A notebook’s small size limits the number of devices you can add inside the case. Some notebook computers allow you to insert devices into special drive bays in the notebook case. Most notebook computers provide expansion ports to which you can attach external devices such as mice, CD or DVD drives, and hard disk drives. Some notebooks also include expansion slots into which you can insert memory cards that hold photos from digital cameras. Key components of a notebook computer are illustrated in Figure 1-9.

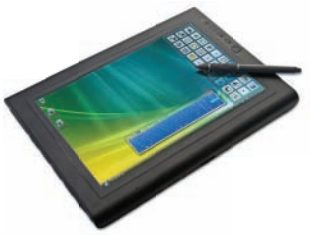
Figure 1-9



Hardware
(continued)

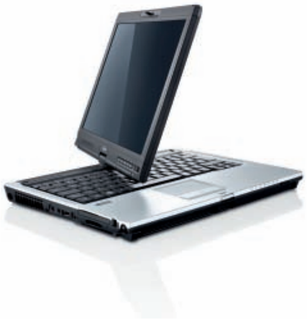
Portable computers come in several styles other than notebooks.

Figure 1-10



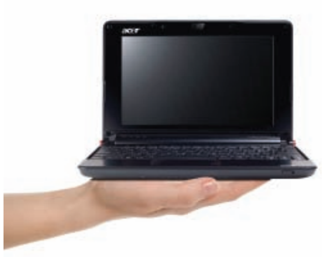
A **tablet computer** is a portable computing device featuring a touch-sensitive screen that can be used as a writing or drawing pad. A **slate tablet** configuration (Figure 1-10) resembles a high-tech clipboard and lacks a built-in keyboard (although one can be attached). A **convertible tablet** computer (Figure 1-11) is constructed like a notebook computer, but the screen folds face up over the keyboard to provide a horizontal writing surface.

Figure 1-11



Tablet computers shine for applications that involve handwritten input. Most tablet computers are also configured to accept voice input. These capabilities are particularly useful for insurance adjusters who do most of their work at the scene of accidents and natural disasters, real estate agents who need access to data while out with clients, and health care workers who are moving quickly from one patient to the next. When tablet computers were first introduced in 2002, they were priced significantly higher than notebook computers with similar processors and memory capacity. Currently, however, tablet computers are priced only slightly higher than equivalent notebook computers.

Figure 1-12



An increasingly popular type of personal computer called a **netbook** offers even more portability than standard-size notebook or tablet computers. Classified as subnotebooks and sometimes referred to as mini-laptops, netbooks, like the one shown in Figure 1-12, are scaled-down versions of standard clamshell-style notebook computers.

Netbooks are typically only seven or eight inches wide and weigh about two pounds. Due to space limitations, most netbooks do not include a CD or DVD drive, but these drives can be connected externally if needed to install software or play DVDs. Netbook screens are not large, but adequate for displaying today's popular software.

A netbook easily fits in a purse, backpack, or briefcase. With a price tag of US$300 or less, netbooks offer an inexpensive alternative to larger computers, but run most of the same software. Netbooks are terrific for school children, excellent for traveling, and useful as a second computer.

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Project

Explore your computer

Whether you own a portable or desktop model, a computer is an important investment that you must protect. You realize the significant role a computer plays in your life when your system crashes and you're unable to complete important tasks. It is therefore essential that you have basic information about your computer at your fingertips in case you need technical support. Knowing your PC's brand, model, and serial number also comes in handy if your computer is lost or stolen. In addition, a strong, secure password helps prevent others from tampering with your files, which is especially important if the files contain confidential information.

When you have completed the project, you should be able to:

- Locate basic system information about your computer, such as the brand, model, and serial number.
- Identify your user account type.
- Change your account picture.
- Evaluate the security of your password.
- Explore the power options on your computer.
- Identify the programs or tasks running on your account.

Requirements: This project requires Microsoft Windows 7. A word processor and e-mail are optional for submitting the deliverable electronically.

The deliverable for Project 1 is a document containing the following information:

1 The type of computer you own or regularly use, plus the brand and model
2 Your computer's serial number
3 Your computer's service tag, if there is one
4 Your Windows user account type
5 Your account picture and the new picture you used to replace it
6 An evaluation of your password's security
7 Your computer's display settings
8 Your computer's sleep settings
9 A list of the applications running on your account

1. Write down the type of computer you own or regularly use (i.e., desktop or notebook). Also note your computer's brand and model. For example, Dell Inspiron 700 is the brand and model of a particular notebook computer. You might find this information printed on the computer case or you might find it by clicking the Start button, clicking Computer on the right side of the Start menu, and then clicking System Properties at the top of the screen. When you have completed this step, click the ☒ Close button to close the System Properties window.

2. Write down your computer's serial number. If you have a desktop model, this information is most likely on the side or back of your system unit. For notebook computers, look under the entire unit.

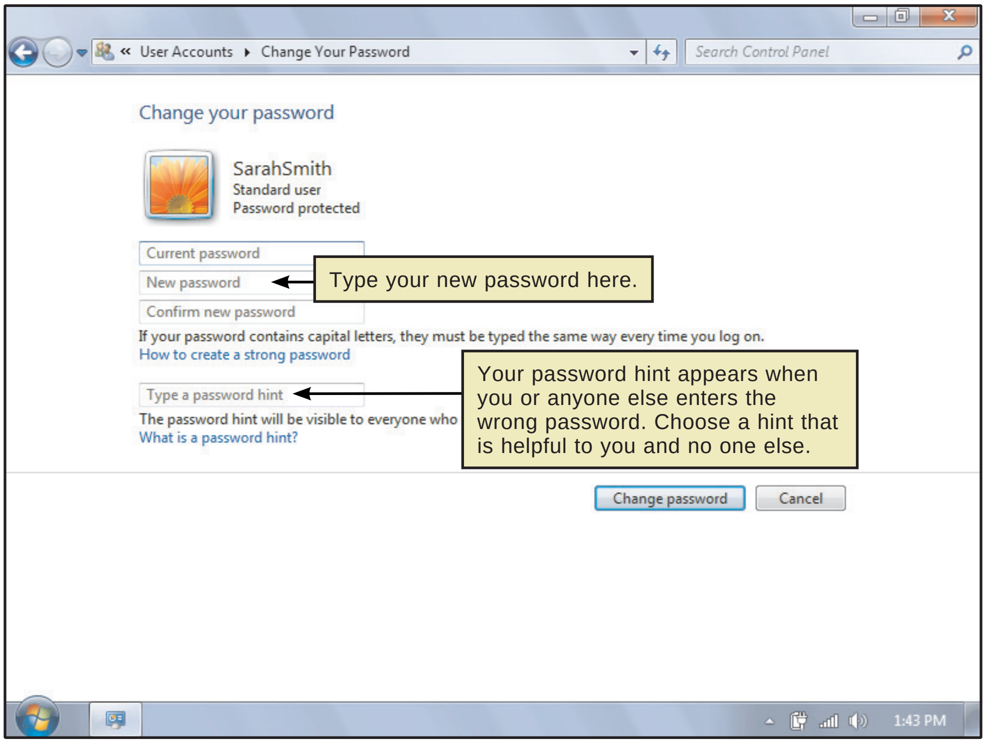
• Explore your computer (continued)

3. Some computer manufacturers also provide a service tag number, which is typically located near the serial number of your desktop or notebook computer. This number, which is usually required by technical support, is associated with the warranty that comes with your computer. Jot down your computer's service tag, if there is one.

4. The Start menu can provide you with pertinent information regarding your user account. For example, you can identify your Windows user account type (i.e., administrator, standard, or guest) by first clicking the Start button, then clicking your account picture at the top of the Start menu. Write down your user account type.

5. You can also modify your account picture while you're viewing the window in Step 4. Click *Change your picture*. Select a new picture and then click the Change Picture button. Make sketches of your previous account picture and the new picture that you selected.

6. Based on what you have learned about passwords, write down whether you consider your password to be secure. If your password is not very secure, use the *Change your password* link to create a more secure password. This link is in the same window as the *Change your picture* link.


« User Accounts ▸ Change Your Password
Search Control Panel
Change your password
SarahSmith
Standard user
Password protected
Current password
New password
Confirm new password
How to create a strong password
Type a password hint
What is a password hint?
Change password
Cancel
1:43 PM

If your password contains capital letters, they must be typed the same way every time you log on.

The password hint will be visible to everyone who

Type your new password here.

Your password hint appears when you or anyone else enters the wrong password. Choose a hint that is helpful to you and no one else.

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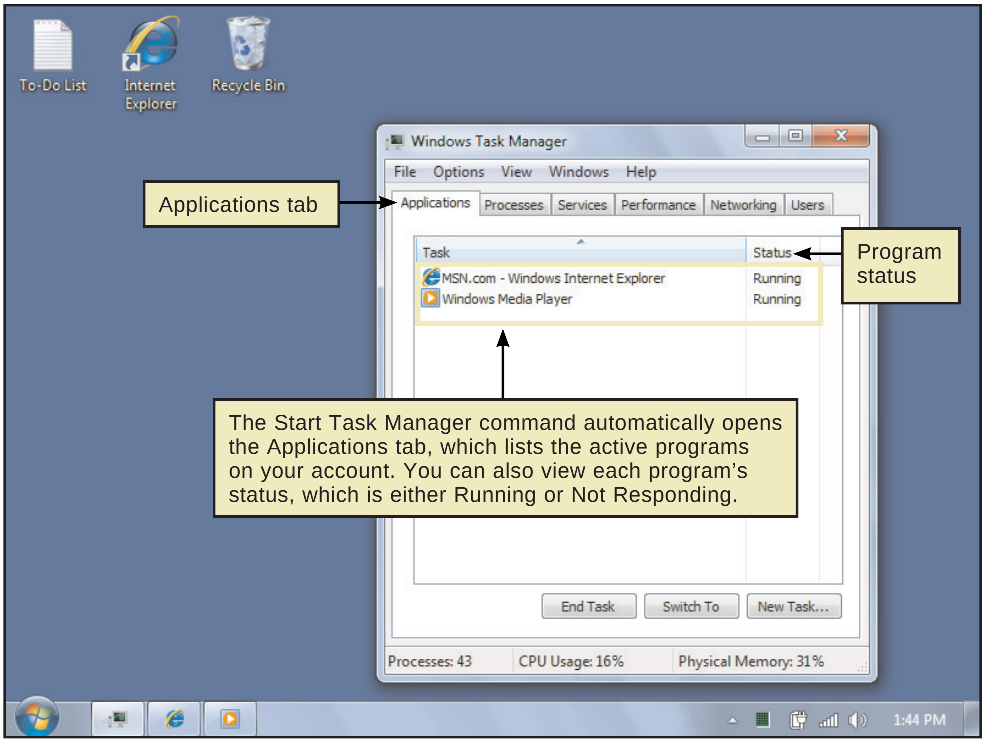
• Explore your computer (continued)

7. It is helpful to know your computer's display and sleep settings so you can modify them according to your needs. Use the Start menu to access the Control Panel. Select System and Security. Under Power Options, select *Change when the computer sleeps*. Write down the amount of time your computer waits before it turns off the display screen. If you have a notebook computer, list two settings—when your computer is running on the battery and when it's plugged in.

8. While you are still viewing the settings window in Step 7, jot down the amount of time your computer waits during a period of inactivity before it goes to sleep. As in Step 7, note the two settings for notebook computers. If the current display and sleep settings do not meet your needs, modify them by clicking the down-arrow button on each setting's box. When you are satisfied with your changes, click *Save changes* at the bottom of the screen.

9. You can use the Windows Task Manager to view the programs or applications that are running on your account. Hold the Ctrl, Alt, and Del keys at the same time. Select Start Task Manager. Write down the applications that are listed and then close the Task Manager.


To-Do List
Internet Explorer
Recycle Bin
Windows Task Manager
File Options View Windows Help
Applications Processes Services Performance Networking Users
End Task Switch To New Task...
1:44 PM

Task	Status
MSN.com - Windows Internet Explorer	Running
Windows Media Player	Running

Processes: 43 CPU Usage: 16% Physical Memory: 31%

Applications tab

Program status

The Start Task Manager command automatically opens the Applications tab, which lists the active programs on your account. You can also view each program's status, which is either Running or Not Responding.

10. To submit this project, consolidate the information you gathered in into a written document, a document created with word processing software, or an e-mail message as specified by your instructor.

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Issue

Is the digital divide growing?

Some people have effective access to information technologies, such as computers, cell phones, and the Internet. Other people have limited or no access. This disparity between technology "haves" and "have nots" is referred to as the digital divide. It is also called the technology gap. Researchers have determined that factors such as gender, race, income, age, education, and location contribute to the digital divide. As you might expect, technology use in developing countries lags behind use in developed countries. Within countries, low-income households tend to own fewer technology tools than middle-income and high-income households.

Are these technology tools so important? One way to answer that question is to imagine your life without a computer or Internet access. Certainly that deficit would limit your educational and employment opportunities. So within the context of our society, computers and the Internet are important economic tools and the digital divide may be depriving "have nots" of important opportunities.

The effect of the digital divide is controversial. Those who cannot afford computers and Internet connections are not necessarily cut off from using those technologies. Many libraries and community organizations provide public access to computers and technology tools. Further, though at first glance it might appear that technology "haves" benefit from a disproportionate amount of computer and Internet access, much of the time this equipment is used for entertainment and has no significant impact on economic opportunities.

Data indicates that the digital divide is closing. Falling computer prices, government initiatives, and programs sponsored by private organizations are succeeding in their efforts to provide technology tools to "have nots." Programs such as Free Geek, 50x15, and One Laptop per Child are tackling the digital divide one computer at a time.

What do you think?

1. Do you own a computer? ○ Yes ○ No ○ Not sure
2. Do you believe that not having a computer at home is likely to limit a person's chances to improve his or her economic status? ○ Yes ○ No ○ Not sure
3. Do you favor spending tax dollars to make computers available in public libraries? ○ Yes ○ No ○ Not sure
4. Would you favor allowing college students to spend their financial aid money on computers? ○ Yes ○ No ○ Not sure

Save It!

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QuickCheck A

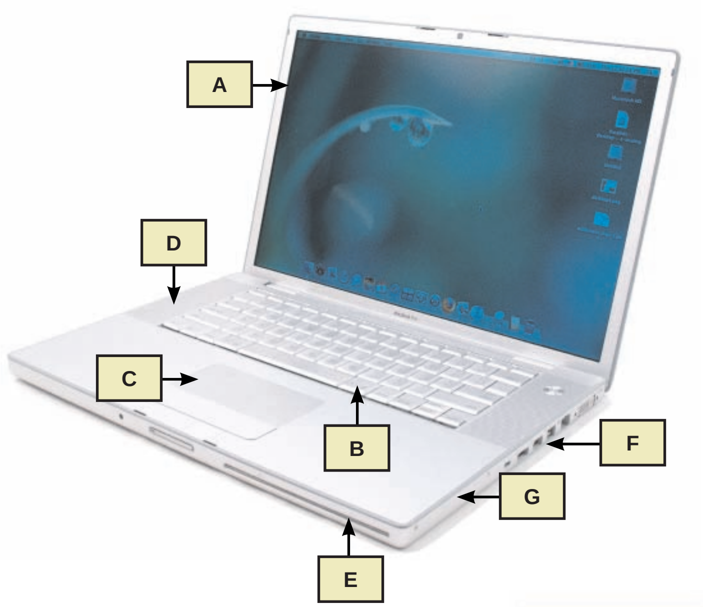
1. A(n) ☐ is the “brain” of your PC, which carries out the commands you issue on data that represents words, numbers, and pictures.
2. Microsoft Windows is ☐ system software, which the computer starts during the boot process.
3. True or false? The password “ez4me!” is more secure than “easyforme.” ☐
4. When you issue the ☐ command, Windows saves your work temporarily and then puts your computer in a low-power state.
5. A(n) ☐ is styled after a notebook computer, but is smaller and typically priced below $300.

CheckIt!

QuickCheck B

Enter the correct letter of the computer components in the boxes shown below.

1. DVD drive ☐
2. Speaker ☐
3. Keyboard ☐
4. Trackpad ☐
5. Expansion ports ☐
6. System unit ☐
7. Screen ☐



CheckIt!

GetIt?

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 1.

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CHAPTER 2

Looking at Windows

What's Inside?

In Chapter 2, you'll discover why the operating system is the core piece of software on your PC. Plus, you'll find out how to start your programs and how to use the tools provided by Windows. Beyond these basics, you'll find information about using special keys on your computer keyboard, customizing your mouse, and learning gestures for controlling the trackpad.

- **FAQs:**
  - Which version of Windows do I have? 19
  - What is the Windows desktop? 20
  - How do I use the Start menu? 21
  - What is an Aero desktop theme? 22
  - What are gadgets? 23
  - What's in the Accessories folder? 24
  - What's the Control Panel? 25
- **Hardware:** Input devices 26
- **Project:** Explore the Windows desktop 29
- **Issue:** Is Windows a monopoly? 32
- **QuickChecks** 33

What's on the CD?

The tours and videos in Chapter 2 are all about customizing your work area; from your desktop theme to the speed of your mouse.

- Take a guided tour of the Windows desktop 20
- Choose a desktop theme 22
- Learn how to work with gadgets 23
- Find out what the Control Panel can do for you 25
- Learn about computer keyboards 26
- Find out how to adjust mouse settings 27

FAQ Which version of Windows do I have?

The operating system is the core piece of software on your PC. You work with it directly to start programs and organize files stored on your disks. The operating system sets the standard for the on-screen controls displayed by all your application software. In addition, the operating system works behind the scenes to detect equipment failure, maintain security, manage storage space, and communicate with all the devices connected to your computer.

Microsoft Windows has evolved through several versions, each one slightly different from the others in terms of features and appearance. Knowing which version of Windows is installed on your computer is useful, especially when troubleshooting hardware and software problems. Of the Windows versions listed in the time line of Figure 2-1, only the last three are in widespread use today.

Figure 2-1

Windows Time Line

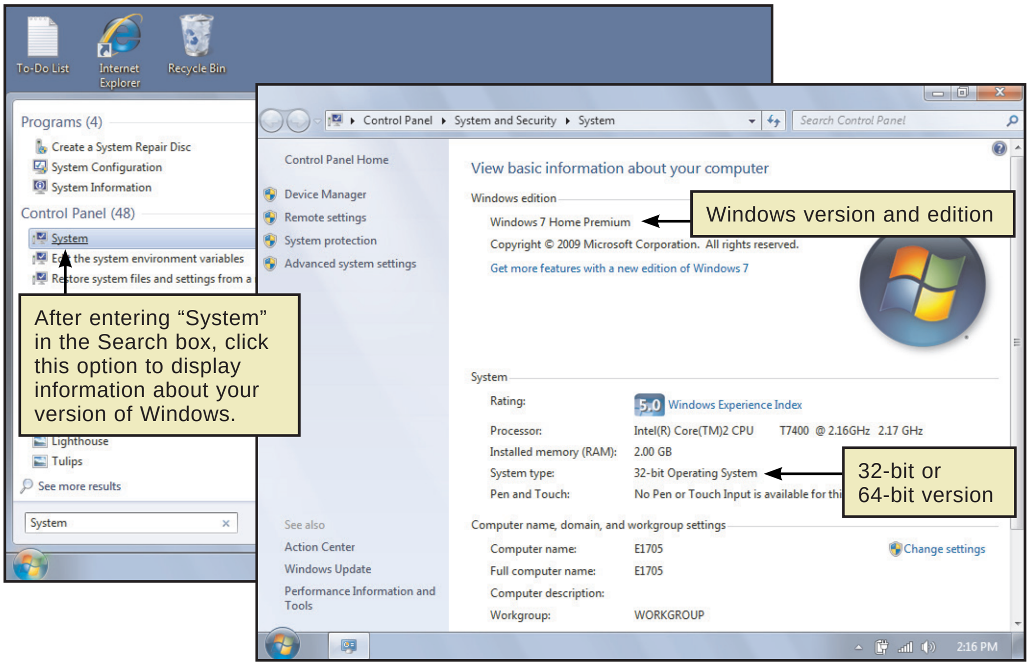
Windows 3.1	Windows 95	Windows 98	Windows Me	Windows XP	Windows Vista	Windows 7
1992	1995	1998	2000	2001	2007	2009

Windows 7 was released in October 2009 and is preinstalled in most computers purchased after that date. It is available in several editions including Starter, Home Premium, Professional, and Ultimate. Windows 7 Starter Edition is typically installed on netbooks. Home Premium is installed on most desktop and notebook computers destined for individual use. Windows Professional and Ultimate editions offer advanced networking features applicable to business installations.

Each edition of Windows 7, except the Starter Edition, is available in 32-bit and 64-bit versions. Most of today's computers have 64-bit microprocessors, so they typically use the 64-bit version of Windows 7.

To discover which version and edition of Windows you're using, enter System in the Start menu's Search box and then click the System option listed under Control Panel as shown in Figure 2-2.

Figure 2-2


To-Do List
Internet Explorer
Recycle Bin
Programs (4)
Create a System Repair Disc
System Configuration
System Information
Control Panel (48)
System
Edit the system environment variables
Restore system files and settings from a
Lighthouse
Tulips
See more results
System
Control Panel ▸ System and Security ▸ System
Search Control Panel
Control Panel Home
Device Manager
Remote settings
System protection
Advanced system settings
See also
Action Center
Windows Update
Performance Information and Tools
Change settings
2:16 PM

View basic information about your computer

Windows edition

Windows 7 Home Premium

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Get more features with a new edition of Windows 7

System

Rating: 5.0 Windows Experience Index

Processor: Intel(R) Core(TM)2 CPU T7400 @ 2.16GHz 2.17 GHz

Installed memory (RAM): 2.00 GB

System type: 32-bit Operating System

Pen and Touch: No Pen or Touch Input is available for thi

Computer name, domain, and workgroup settings

Computer name: E1705

Full computer name: E1705

Computer description:

Workgroup: WORKGROUP

After entering "System" in the Search box, click this option to display information about your version of Windows.

Windows version and edition

32-bit or 64-bit version

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FAQ What is the Windows desktop?

The **Windows desktop** is the gateway to all the tasks you perform with your PC. It is the screen you see after you log in, and it remains in the background as you use other software. The desktop contains small graphics called **icons** that represent programs, hardware, and documents. Clicking an icon gives you access to the hardware or software component that it represents.

The **taskbar** at the bottom of the screen includes the Start button and the notification area. The **Start button** is the main control on the Windows desktop. When you click this button, Windows displays the **Start menu**. You can use this menu to start programs, search for files, change your hardware settings, get help, and install software.

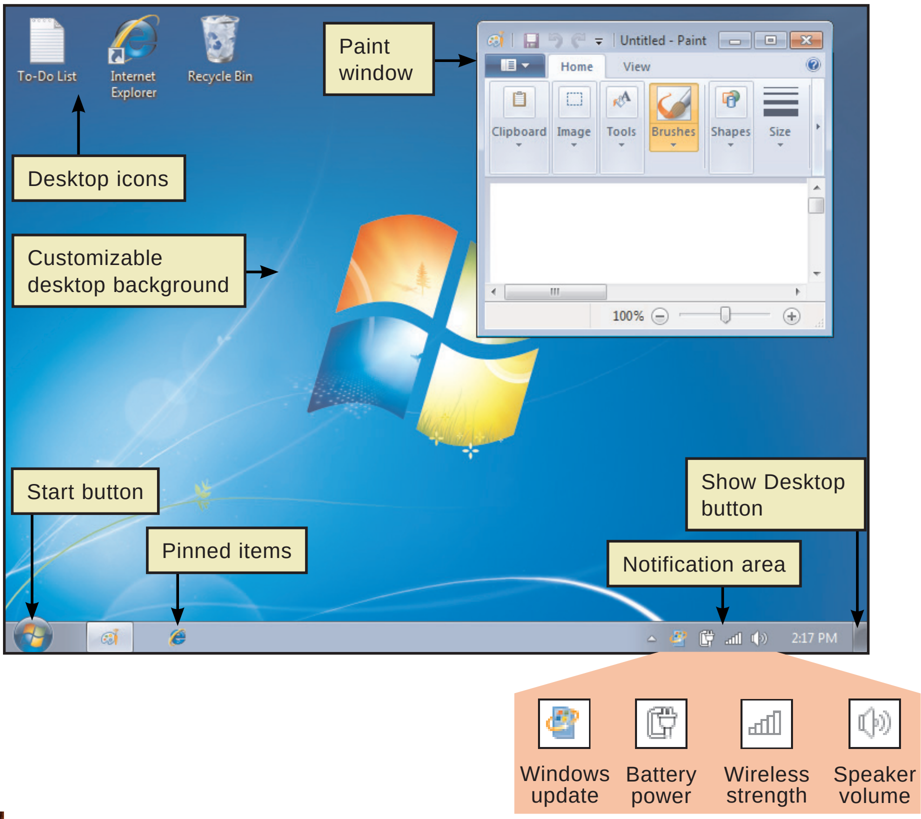
The **notification area** on the rightmost side of the taskbar displays the time, along with icons that indicate the status of computer settings, such as speaker volume, remaining battery power, and network connection strength. Double-clicking one of these icons allows you to access and change its settings. Additional icons might appear when your computer encounters a printer problem or when software updates are available. On the far right side of the notification area, the **Show Desktop button** moves open windows out of the way and brings you back to the desktop.

The main area of the desktop displays rectangular-shaped **windows** (that's "windows" with a lowercase "w") for programs, files, alerts, and settings. The middle section of the taskbar displays a button for each of these windows so that you can keep track of everything you are working on. You can click the taskbar buttons to easily switch from one program or file to another. Programs that you use frequently can be "pinned" to the taskbar. **Pinned buttons** are always displayed on the taskbar and can be accessed with one click instead of proceeding through the Start menu.

Click the Try It! button in Figure 2-3 for a guided tour of the Windows desktop.

Try It!

Figure 2-3


To-Do List
Internet Explorer
Recycle Bin
Paint window
Untitled - Paint
Home
View
Clipboard
Image
Tools
Brushes
Shapes
Size
100%
Desktop icons
Customizable desktop background
Start button
Pinned items
Show Desktop button
Notification area
2:17 PM
Windows update
Battery power
Wireless strength
Speaker volume

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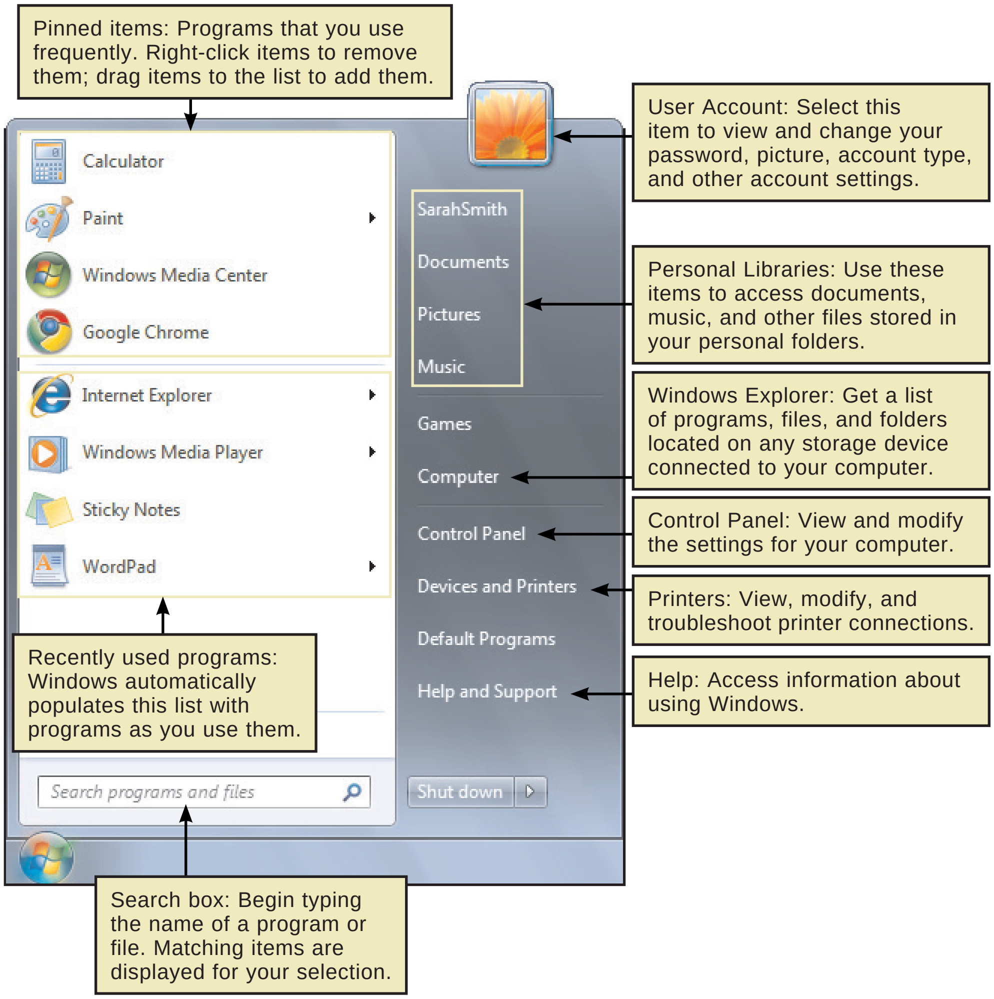
FAQ How do I use the Start menu?

When you click the round Start button on the Windows taskbar, the Start menu opens and displays useful controls for opening programs, finding files, customizing computer settings, and getting help. You already learned about shut down, sleep, hibernate, and reset options offered on the Start menu. Study Figure 2-4 to understand other important features of the Start menu.

Figure 2-4


Calculator
Paint
Windows Media Center
Google Chrome
Internet Explorer
Windows Media Player
Sticky Notes
WordPad
Search programs and files
SarahSmith
Documents
Pictures
Music
Games
Computer
Control Panel
Devices and Printers
Default Programs
Help and Support
Shut down

Pinned items: Programs that you use frequently. Right-click items to remove them; drag items to the list to add them.

User Account: Select this item to view and change your password, picture, account type, and other account settings.

Personal Libraries: Use these items to access documents, music, and other files stored in your personal folders.

Windows Explorer: Get a list of programs, files, and folders located on any storage device connected to your computer.

Control Panel: View and modify the settings for your computer.

Printers: View, modify, and troubleshoot printer connections.

Help: Access information about using Windows.

Recently used programs: Windows automatically populates this list with programs as you use them.

Search box: Begin typing the name of a program or file. Matching items are displayed for your selection.

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FAQ What is an Aero desktop theme?

The Windows desktop can be customized in many ways to change its appearance and even some of the ways you interact with it. Although you can change individual aspects of the desktop, such as the background and font size, Windows includes several predefined **desktop themes** created by professional designers.

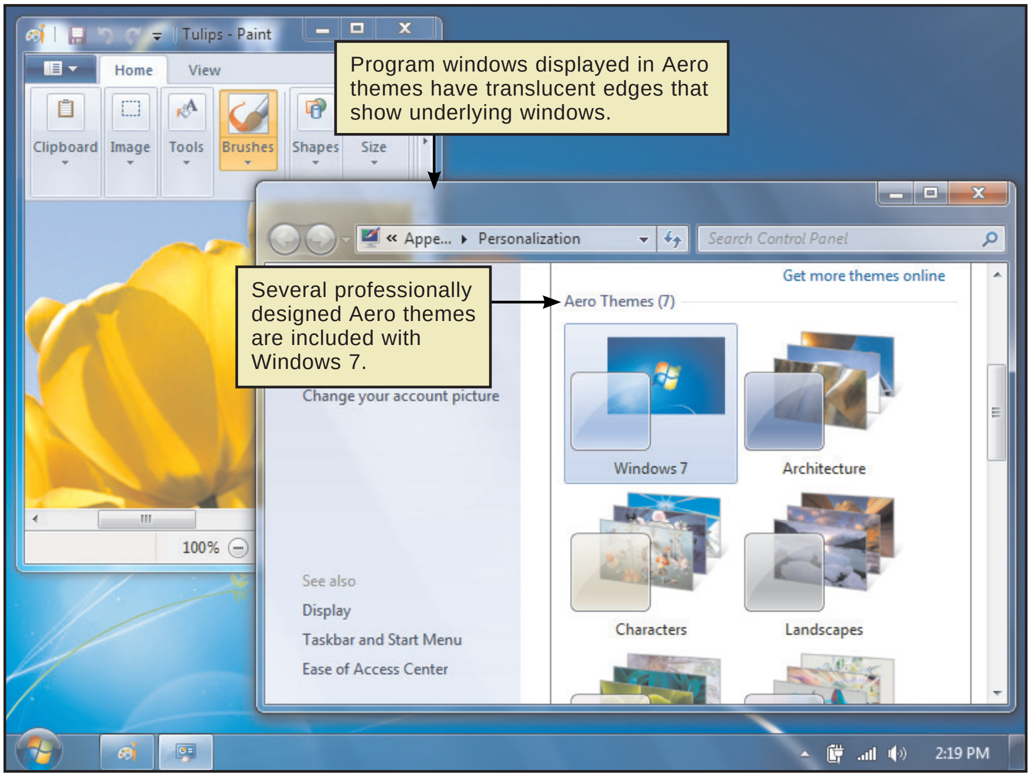
An **Aero desktop theme** incorporates design elements such as translucent windows and animated icons, intended to be efficient to use and aesthetically pleasing. In addition to attractive eye candy, Aero themes offer the following handy features:

- **Aero peek.** Hovering the mouse pointer over a taskbar button displays a thumbnail-sized preview of the program window and its contents, which could be a document, graphic, or even a video clip.
- **Aero snap.** Dragging a window to the top of the screen enlarges it to the full size of the desktop. Dragging a window to the right or left side of the screen resizes the window so it fills only half the screen; that's handy if you want to compare the contents of two windows.
- **Aero shake.** Dragging a window back and forth quickly clears all the other windows from the desktop; shaking the window again brings the other windows back.

You can select and modify desktop themes by entering "Theme" in the Start menu Search box, then choosing a theme from the list as shown in Figure 2-5.

TryIt!

Figure 2-5



Program windows displayed in Aero themes have translucent edges that show underlying windows.

Several professionally designed Aero themes are included with Windows 7.

Tulips - Paint
Home
View
Clipboard
Image
Tools
Brushes
Shapes
Size
100%
« Appe... ▸ Personalization
Search Control Panel
Get more themes online
Aero Themes (7)
Change your account picture
Windows 7
Architecture
Characters
Landscapes
See also
Display
Taskbar and Start Menu
Ease of Access Center
2:19 PM

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FAQ What are gadgets?

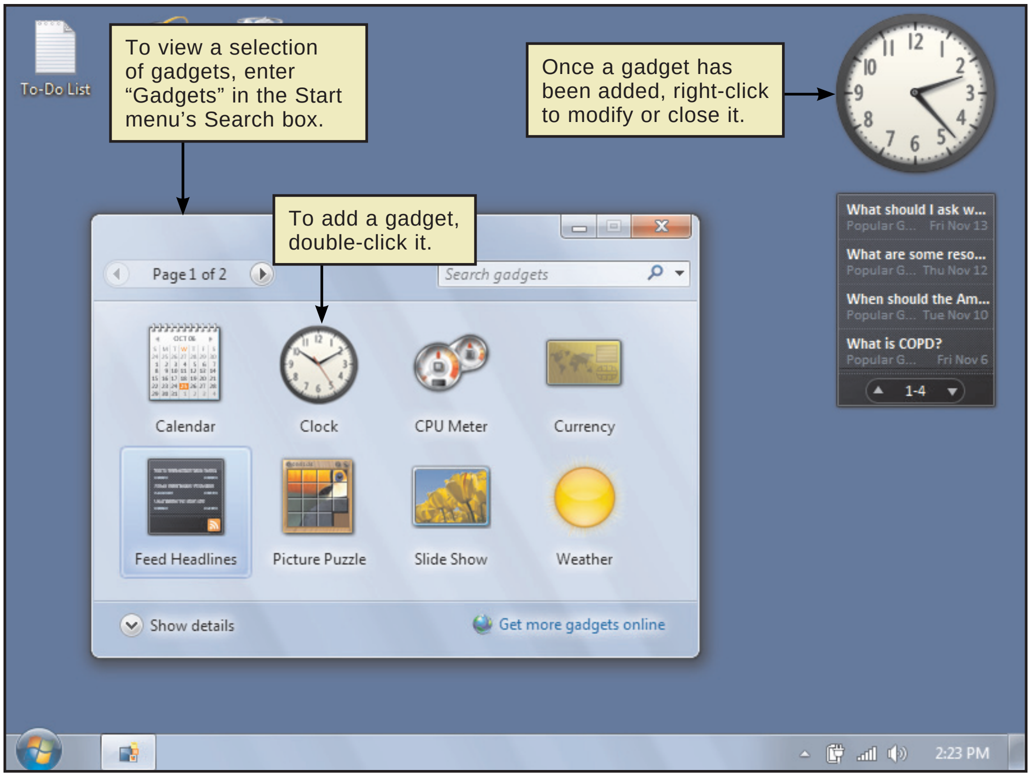
A **gadget** is a mini-application, typically designed to display information such as the time of day, local weather, headline news, photo slide shows, or statistics about how hard your computer's microprocessor is working.

Several gadgets are included with Windows 7; Microsoft's online Gadget Gallery offers additional gadgets, many developed by Windows users. You can select gadgets that you would like to use and park them on your desktop. Gadgets require system resources, so be aware that having lots of gadgets can potentially slow down some of your daily tasks.

Gadgets work best if your computer has a widescreen display device because you can corral your gadgets on the side of the screen and still have plenty of room to display application windows containing e-mail, word processing, and other work on your desktop. You can also use a gadget's *Always on top* setting so that it is always visible on top of other application windows. Use the Try It! button for Figure 2-6 to find out how to select gadgets and adjust their settings.

Try It!

Figure 2-6



To view a selection of gadgets, enter "Gadgets" in the Start menu's Search box.

Once a gadget has been added, right-click to modify or close it.

To add a gadget, double-click it.

To-Do List
Page 1 of 2
Search gadgets
Calendar
Clock
CPU Meter
Currency
Feed Headlines
Picture Puzzle
Slide Show
Weather
Show details
Get more gadgets online
What should I ask w...
Popular G... Fri Nov 13
What are some reso...
Popular G... Thu Nov 12
When should the Am...
Popular G... Tue Nov 10
What is COPD?
Popular G... Fri Nov 6
1-4
2:23 PM

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FAQ What's in the Accessories folder?

When you click the Start button and select All Programs, Windows displays a list of programs and folders. Included in this list is the **Accessories folder** that links to several basic applications that are included with Windows. Some of these applications are quite useful:

Windows Explorer helps you find and organize files and folders.

Paint is a graphics tool useful for editing photos from a digital camera or scanner.

Notepad and WordPad are text editors you can use in a pinch if you don't have word-processing software.

Snipping Tool is an alternative to the Print Screen key for capturing what's on your screen in a format you can supply to your instructor as part of an assignment, or to a support technician for troubleshooting.

Calculator is an on-screen calculator for basic mathematical tasks.

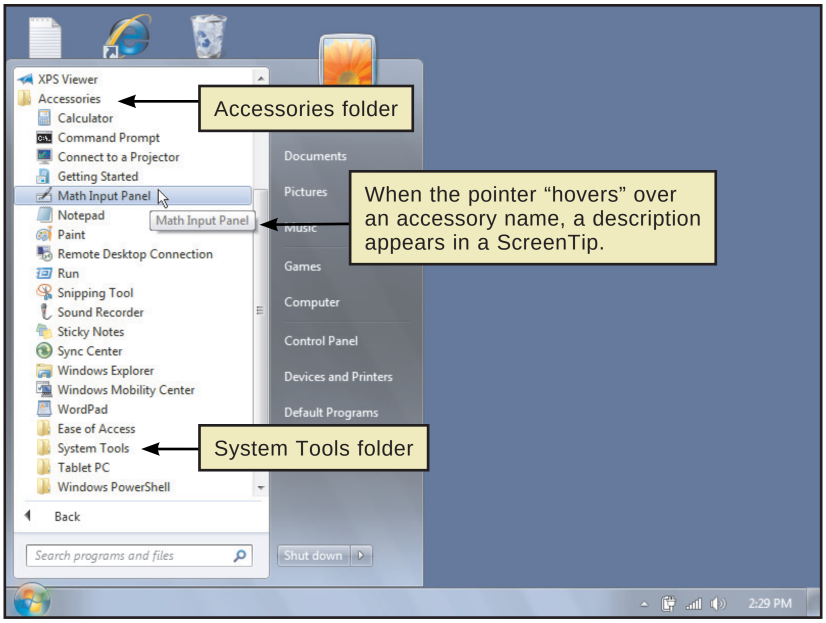
Sound Recorder captures music and narrations from a microphone connected to your computer.

An Accessories subfolder called **System Tools** includes a collection of utilities that you can use to keep your computer running smoothly. Disk Cleanup and Disk Defragmenter ensure that your hard disk is free of unnecessary files and that disk space is utilized efficiently. The System Restore utility can create a restore point, which is a snapshot of your system, before you install any new software or hardware. You can later go back to the restore point if you experience problems with what you have just installed.

Another Accessories subfolder, **Ease of Access**, offers tools to configure your computer for adaptive use, such as magnifying parts of the screen or narrating text displayed on the screen. It can also be used to display a keyboard on the screen that can be manipulated by a mouse or adaptive input device. The Speech Recognition option configures Windows to be used with voice commands instead of a mouse or keyboard.

When accessing the Accessories folder, you can hover the mouse over any option to view its description in a **ScreenTip** as shown in Figure 2-7.

Figure 2-7


XPS Viewer
Accessories
Calculator
Command Prompt
Connect to a Projector
Getting Started
Math Input Panel
Notepad
Math Input Panel
Paint
Remote Desktop Connection
Run
Snipping Tool
Sound Recorder
Sticky Notes
Sync Center
Windows Explorer
Windows Mobility Center
WordPad
Ease of Access
System Tools
Tablet PC
Windows PowerShell
Back
Search programs and files
Documents
Pictures
Music
Games
Computer
Control Panel
Devices and Printers
Default Programs
Shut down
2:29 PM

Accessories folder

When the pointer "hovers" over an accessory name, a description appears in a ScreenTip.

System Tools folder

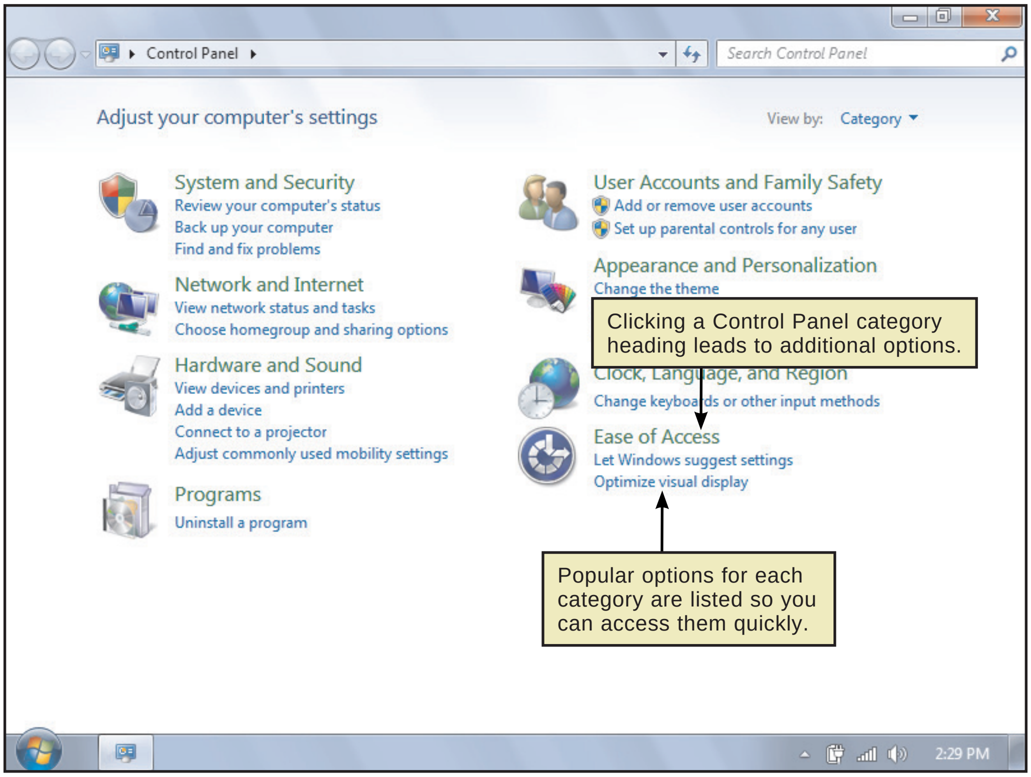
FAQ What's the Control Panel?

The **Control Panel** contains some of the most important tools for configuring and customizing Windows. It allows you to modify settings for date and time, hardware devices, network connections, security controls, and the appearance of your desktop. You can directly access the Control Panel by opening the Start menu and selecting the Control Panel option.

Control Panel options are grouped into categories that include System and Security, Network and Internet, Hardware and Sound, and Programs. The most popular options for each category are displayed in blue text that you can click for direct access. Those are not the only options available, however. When you click a category heading, you will see additional options. Sometimes it takes a bit of exploration to find the Control Panel option you want to use. You'll see how the Control Panel is organized when you click the Try It! button in Figure 2-8.

Try It!

Figure 2-8


Control Panel
Search Control Panel
Adjust your computer's settings
View by: Category
System and Security
Review your computer's status
Back up your computer
Find and fix problems
Network and Internet
View network status and tasks
Choose homegroup and sharing options
Hardware and Sound
View devices and printers
Add a device
Connect to a projector
Adjust commonly used mobility settings
Programs
Uninstall a program
User Accounts and Family Safety
Add or remove user accounts
Set up parental controls for any user
Appearance and Personalization
Change the theme
Clock, Language, and Region
Change keyboards or other input methods
Ease of Access
Let Windows suggest settings
Optimize visual display
2:29 PM

Clicking a Control Panel category heading leads to additional options.

Popular options for each category are listed so you can access them quickly.

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Hardware

Input devices

What makes a computer easy to use? The answer is a well-designed user interface. A **user interface** is the combination of hardware and software that manages the way humans and computers interact. In a well-designed user interface, accomplishing any task should be easy, and learning a new task should be intuitive.

Windows defines the major user interface elements for PCs. Virtually every PC software package sports a Windows-based **graphical user interface** (GUI, pronounced “gooey”), which includes icons, menus, dialog boxes, and toolbars that you manipulate with the keyboard, mouse, and trackpad. The user interface provides two-way communication between you and your PC. It provides an input method that allows you to communicate information to the computer. It also provides an output method so that the computer can communicate information to you.

The keyboard, mouse, and trackpad are standard input devices for the Windows GUI. The mouse is the primary pointing device for desktop computers. Notebook and netbook computers typically have a touchpad as the primary pointing device, but a mouse can be connected, too.

Computer keyboards come in many sizes and configurations. Some are squeezed into cases that don’t allow room for many frills, whereas others are large enough to sport many specialized keys designed to give you quick access to e-mail, music, and the Internet.

In addition to keys for typing letters, numbers, and symbols, most computer keyboards include the keys listed below. Play the video in Figure 2-9 to discover the location of these keys and find out what they do.

- **Function keys:** F1, F2, and so on are lined up across the top of the keyboard and invoke special functions depending on the software being used.
- **Arrow keys:** Move a place marker such as an insertion point or cursor up, down, right, or left.
- **Ctrl key:** Held down while pressing other keys, this key performs menu shortcuts. Also called the Control key.
- **Alt key:** Works in a similar way as the Ctrl key.
- **Windows key:** Opens the Start menu.
- **Esc key:** Can be used to cancel an action or close a menu. Also called the Escape key.

PlayIt!

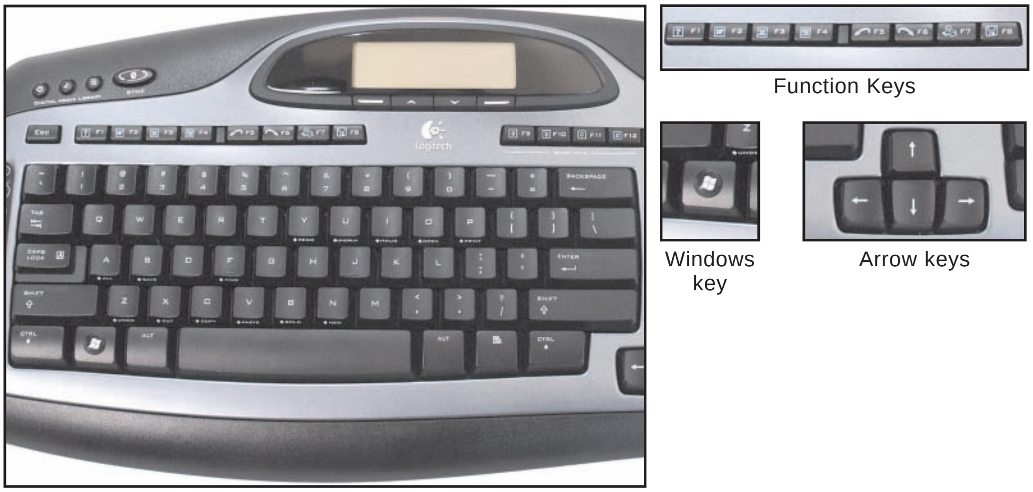

Figure 2-9

Function Keys

Windows key

Arrow keys

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Hardware
(continued)

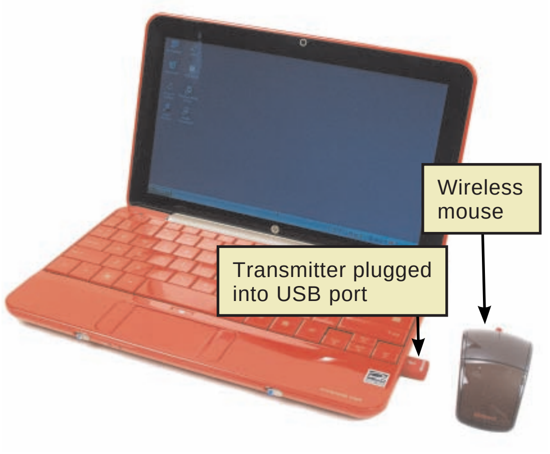
A **mouse** is an input device that controls an on-screen pointer that's used to manipulate buttons, icons, and windows with the **mouse gestures** listed in Figure 2-10.

Figure 2-10

Mouse Gestures	
Clicking	Pressing and releasing the left button
Right-clicking	Pressing and releasing the right button
Scrolling	Pushing or pulling the scroll wheel
Double-clicking	Pressing and releasing the left button twice in quick succession
Dragging	Holding down the left mouse button while moving the mouse
Hovering	Positioning the mouse on a screen-based object without clicking

Originally, mice used mechanical technology that involved a ball embedded in the bottom of the mouse. The optical technology in most of today's mice uses a special image processing chip to track mouse movements over the surface of a desk or mouse mat. The light you see emitted from the underside of a mouse is an LED or laser light that illuminates the surface and enables a sensor to determine the direction of movement.

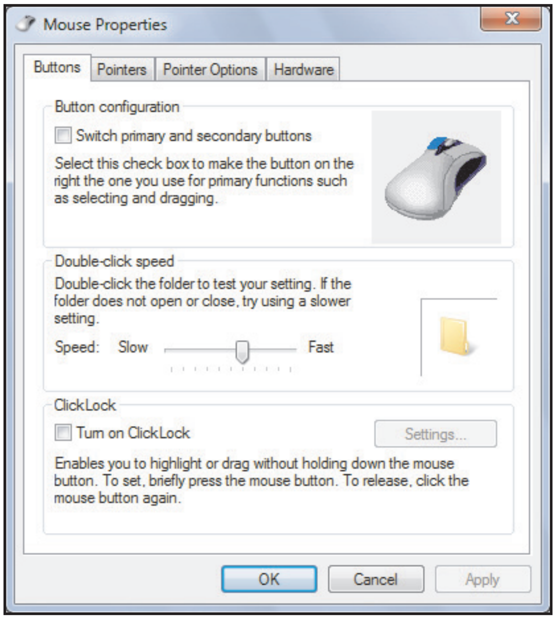
Figure 2-11



Most mice have two **mouse buttons** for clicking and a **scroll wheel** for scrolling. Mice come in wired and wireless models. A **wired mouse** typically plugs into a computer's USB expansion port and draws power from the computer to operate the mouse light and sensor. A **wireless mouse** contains a transmitter that sends the mouse position to your computer. To receive the mouse position, your computer requires a receiver, which is typically plugged into a USB port as shown in Figure 2-11.

TryIt!

Figure 2-12



Button configuration

☐ Switch primary and secondary buttons

Select this check box to make the button on the right the one you use for primary functions such as selecting and dragging.

Double-click speed

Double-click the folder to test your setting. If the folder does not open or close, try using a slower setting.

Speed: Slow — Fast

ClickLock

☐ Turn on ClickLock

Enables you to highlight or drag without holding down the mouse button. To set, briefly press the mouse button. To release, click the mouse button again.

You can adjust several mouse settings. For example, you can reverse the function of the buttons for left-handed use. You can also adjust the tracking speed; you might want to speed up your mouse if your computer has a very large screen. In addition, you can use the Control Panel to adjust the double-click speed and change the appearance of the mouse pointer. Figure 2-12 shows you how to adjust your mouse settings.

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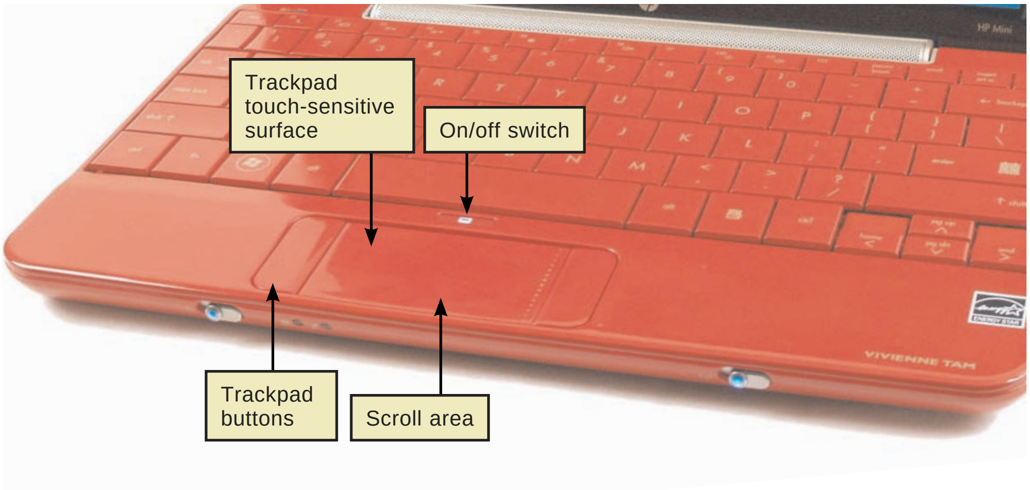
Hardware

(continued)

A **trackpad** (also called a touchpad or mousepad) is a pointing device typically built into the system unit of a notebook or netbook computer. The device includes buttons that perform the same functions as mouse buttons. In addition, there is a touch-sensitive pad that can track gestures. Many trackpads have an on/off switch so they can be disabled when a mouse is used (Figure 2-13).

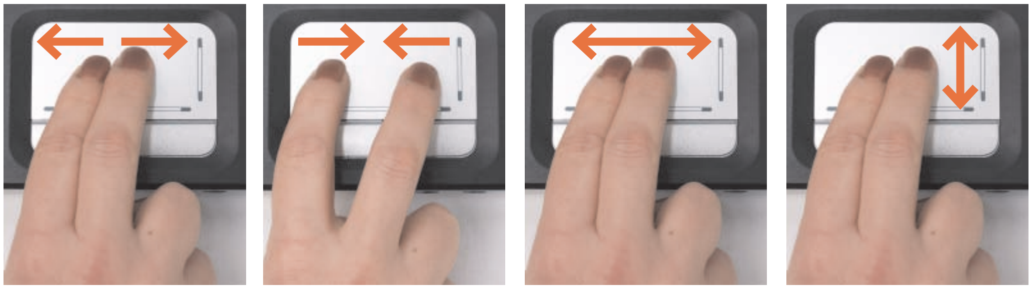
Figure 2-13



A basic trackpad follows up, down, right, and left gestures that correspond to similar mouse movements. Sliding your finger to the right on a trackpad is similar to moving a mouse to the right, for example. Most trackpads also have an area along the right side that can be used for scrolling.

If you have a **multi-touch trackpad**, it accepts additional gestures, such as those illustrated in Figure 2-14.

Figure 2-14

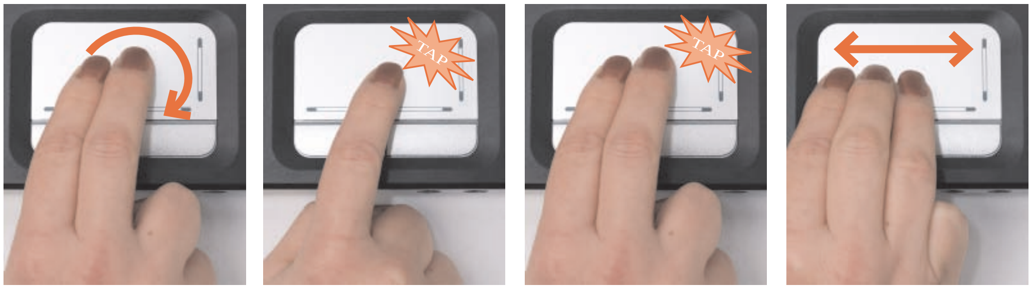


Zoom in: Move two fingers apart to zoom in and enlarge photos or documents.

Zoom out: Move two fingers closer to each other to reduce the size of images or documents.

Horizontal scrolling: Move two fingers to the right or left.

Vertical scrolling: Move two fingers up or down.



Rotate: Turn two fingers on the trackpad to rotate an image.

Tap: Tapping the trackpad performs the same function as clicking a mouse button.

Two-finger tap: Tapping the trackpad with two fingers generates a right-click.

Swipe: Move three fingers horizontally to step through a series of photos, album covers, or windows.

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Project

Explore the Windows desktop

In this chapter, you were introduced to Windows 7. You also learned about elements on the Windows desktop that open up a whole range of programs and tools you can use for customizing your desktop, maintaining your computer system, and accomplishing many tasks.

In this project, you will learn how to customize the Windows desktop and further explore the elements it includes. When you have completed this project, you should be able to:

- Customize your desktop using the Control Panel.
- Familiarize yourself with gadgets.
- Familiarize yourself with the notification area.
- Use two ways to start programs: from the Search box and from the taskbar.
- Take a snapshot of your screen using the Print Screen key and the Paint program.

Requirements: This project requires Microsoft Windows 7 and Paint. Word processing software or e-mail are optional for submitting deliverables electronically.

Deliverables:

1 A list of five desktop items you might want to customize
2 A list of three gadgets you would find useful
3 A list of icons pinned to the taskbar
4 A list of two programs that might be useful to pin to the taskbar
5 A list of icons in the notification area
6 A list of hidden icons in the notification area
7 A list of similarities and differences between items pinned to the taskbar and the taskbar notification area
8 A screenshot of the Windows desktop

1. You can personalize your desktop by changing various characteristics of the standard desktop. Open the Start menu by clicking the Start button. Select Control Panel and click *Appearance and Personalization*. Review all the options and list five items that you might like to customize.

2. Suppose you want to change your desktop background. Under Personalization, select *Change desktop background*. Make sure the *Picture location* box contains “Windows Desktop Backgrounds.” If it does not, click the down-arrow button located on the box and select the *backgrounds* option.

3. Scroll down to Scenes and hover the mouse pointer over each photo to display its name. When you find img29, click it. When you’ve selected the image, click the *Save changes* button. Close the Personalization window by clicking its ☒ Close button. Your desktop should now display img29 as the background.

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• Explore the Windows desktop (continued)

4. You can also add Gadgets to the desktop. To open the Desktop Gadget Gallery, click the Start button and type **gadget** in the Search box. Click Desktop Gadget Gallery. Write down three gadgets that you think would be useful to display on your desktop. To find out more about each gadget, click *Show details* at the bottom left of the Desktop Gadget Gallery window.

5. Suppose you want your CPU usage displayed on the desktop. Double-click the CPU meter gadget to open it on your desktop. Close the Desktop Gadget Gallery window by clicking the ✕ Close button. Jot down your computer's CPU usage and RAM usage shown on the CPU gadget.

6. Examine the taskbar. List the names of the icons that are pinned to the taskbar. If you're not familiar with an icon, the icon name should appear when you hover the mouse pointer on the icon.

7. Jot down two programs that you frequently use that you might want to pin to the taskbar.

8. Examine the notification area of the taskbar. List the names of the icons that are displayed there. Hover the mouse pointer on the icon to display the icon name.

9. Click the ▲ button in the notification area to display any hidden icons. Depending on how your taskbar is configured, some icons are always displayed, some are displayed only when the corresponding program is active, and some are always hidden. List the names of the hidden icons. Based on your observations, write down any differences and similarities between the kinds of items that are pinned to the taskbar and those that are pinned to the notification area.

10. For this project and some future projects, you will be required to take snapshots of your screen (also called screenshots or screen captures). To learn how to take screenshots, open the Start menu and select Help and Support. A rectangular window appears and displays Help and Support options. Type **screen capture** in the Search box at the top of the window and press Enter. Click *Take a screen capture (print your screen)* from the list of results. Read the information about how to take a screen capture, but don't capture anything yet. Click the ▬ Minimize button in the upper-right corner of the Windows Help and Support window. The window is reduced to a button on the taskbar.

11. Now, to take the screenshot, press the PrtSc or Print Screen key, located somewhere at the top of your keyboard. On some computers, you might have to hold down a key marked Fn as you press the PrtSc key.

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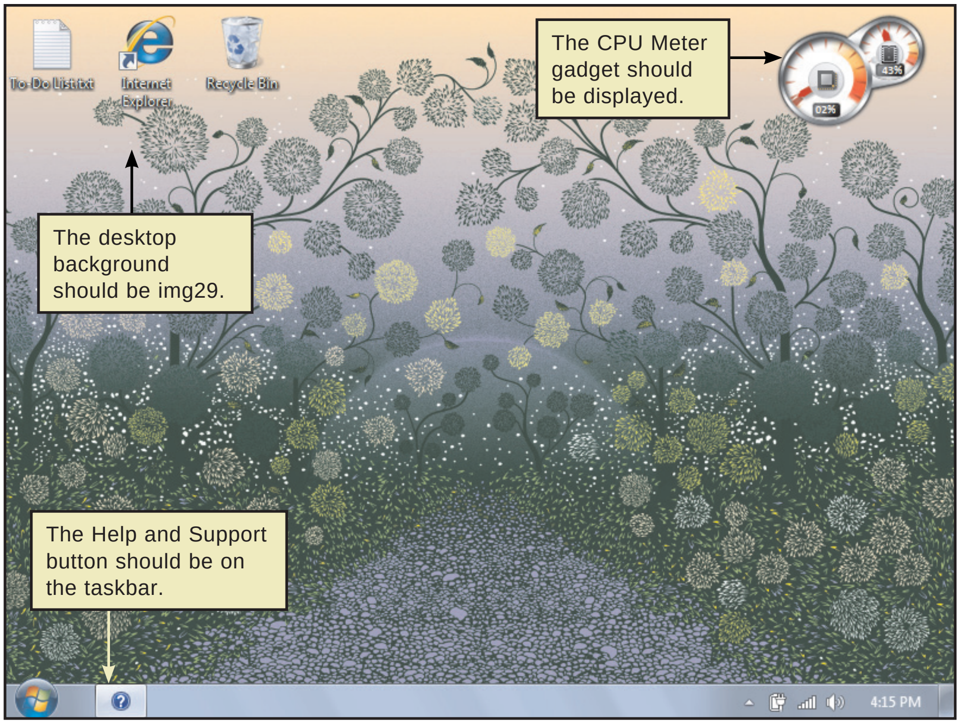
• Explore the Windows desktop (continued)

12. The screenshot is temporarily held in your computer's memory. To view it, you can use the Paint program. Open Paint by clicking the Start button and typing **paint** in the Search box. Select Paint from the Programs list. Click the Paste button. The snapshot of your screen should now be displayed. Except for the desktop icons and some Sidebar gadgets, your screenshot should be very similar to the example below.



The CPU Meter gadget should be displayed.

The desktop background should be img29.

The Help and Support button should be on the taskbar.

13. You can save your screenshot and print it by clicking the 💾 icon in the upper-left corner of your Paint window. A Save As window should appear asking you to enter a file name. Type **Project 2 [Your Name]**. Click the Save button. The Save As window should close automatically and your screenshot should be in your Pictures folder. To print the screenshot, click the ▤▾ button, then select Print. When the Print window opens, select the desired printer, then click the Print button. Click the ▭ Minimize button on the Paint window. There should now be a Paint button on your taskbar.

14. You can preview small thumbnails of open application windows by hovering over taskbar buttons. First, hover over the Help and Support taskbar button. Next, move the pointer to hover over the thumbnail. What happens? What if you move the pointer off the thumbnail? What happens if you click the thumbnail? Summarize what you've learned about toolbar buttons and thumbnails in a sentence or two.

15. You can click a program's taskbar button to view the program window, but when you right-click the button, a jump list appears. Right-click the Help and Support taskbar button. Select the option to pin the program to the taskbar. Now, help will always be accessible from the taskbar.

16. Consolidate the deliverables for Project 2 into printed format, a document file, or an e-mail message as specified by your instructor.

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Issue

Is Windows a monopoly?

Microsoft Windows is the operating system used with more than 90% of the world's computers. One advantage of such huge market share is standardization. If you know how to use Windows, you'll have a pretty good idea how to work with just about any computer.

Another advantage of Microsoft's massive market share is a wide variety of application software. When your computer runs Windows, you have access to a vast library of software created by third-party developers. Software developers understand that producing applications that run on Windows machines gives them a much larger potential market than for other operating systems. Consumers would seem to benefit from the abundance of software these developers create.

According to some consumer advocates, however, Microsoft's dominant role is not beneficial for consumers. Its virtual monopoly over the operating system market has the potential to stifle competition, drive up computer prices, and limit consumer choice.

Microsoft has paid billions of dollars in fines resulting from anti-trust lawsuits in the U.S., Japan, and E.U. Some of these cases were based on Microsoft's policy of bundling accessories, utilities, and various tools with the Windows operating system. One anti-trust lawsuit objected to the Media Player being included with Windows. Another lawsuit objected to the inclusion of software used to access the Web. Critics alleged that bundling these tools with Windows stifled competitors who might create alternative tools and provide consumers with more choice.

Questions about Microsoft's aggressive OEM licensing have also been the focus of anti-trust scrutiny. OEM licenses granted to computer vendors, such as Dell and Hewlett-Packard, allow them to preinstall Windows on new computers. Bulk pricing as low as $10 per unit is available to vendors, but Microsoft often places severe limitations on the number of non-Windows computers that a vendor can sell. Critics claim that this practice stifles healthy competition from alternative operating systems.

Anti-trust laws are designed to maintain balance and competition in the marketplace. Despite anti-trust lawsuits, Microsoft maintains a huge share of the operating system market. Perhaps there is a benefit in standardization, or maybe a strong competitor has not yet been offered to consumers. With its overwhelming market share and deep pockets, Microsoft is a big target for anti-trust crusaders. There is little doubt that Microsoft will have to continue to defend its bundling and licensing policies.

What do you think?

1. If you purchase a new computer, would you prefer to use preinstalled Internet software instead of obtaining and installing the Internet software of your choice? ○ Yes ○ No ○ Not sure
2. Do you think Microsoft's dominant share of the operating system market is detrimental to consumers? ○ Yes ○ No ○ Not sure
3. Have you ever used any operating system other than Windows? ○ Yes ○ No ○ Not sure

Save It!

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QuickCheck A

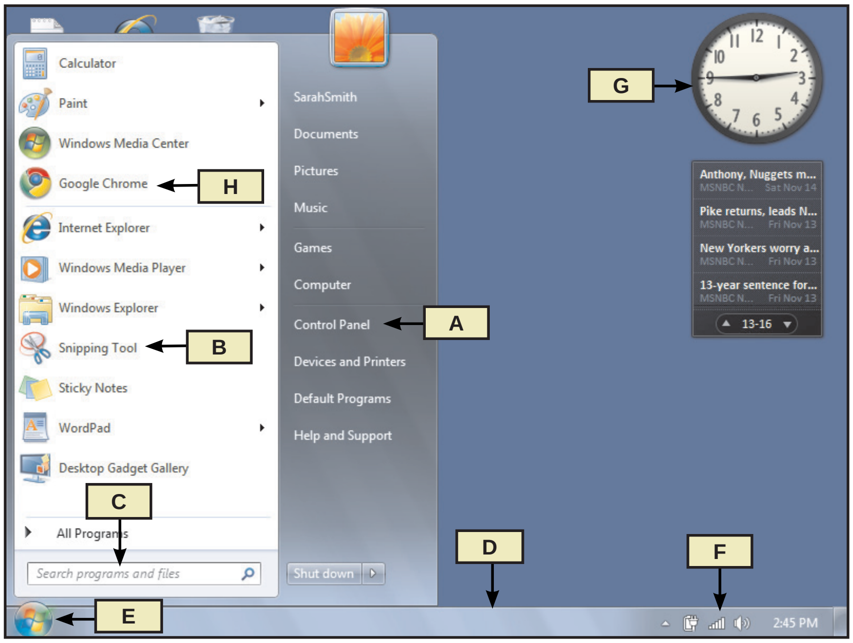
1. The Windows ☐ appears on the screen after you log in and remains in the background as you use other software programs.
2. You can keep ☐ , such as the clock and CPU meter, always in view by selecting *Always on top*.
3. The ☐ folder contains basic applications, such as Paint and Calculator, that are included with Windows 7.
4. True or false? Microsoft Windows is classified as application software. ☐
5. Windows has a graphical user ☐ , which includes icons, menus, dialog boxes, and toolbars that you manipulate with the keyboard and mouse.

CheckIt!

QuickCheck B

Identify the desktop element by typing the letter corresponding to it.

1. Search box ☐
2. Gadget ☐
3. A pinned item ☐
4. Taskbar ☐
5. Screenshot capture application ☐
6. Access to configuration and customization options ☐
7. Taskbar notification area ☐


Calculator
Paint
Windows Media Center
Google Chrome
H
Internet Explorer
Windows Media Player
Windows Explorer
Snipping Tool
B
Sticky Notes
WordPad
Desktop Gadget Gallery
C
All Programs
Search programs and files
E
SarahSmith
Documents
Pictures
Music
Games
Computer
Control Panel
A
Devices and Printers
Default Programs
Help and Support
Shut down
D
G
F
Anthony, Nuggets m...
Pike returns, leads N...
New Yorkers worry a...
13-year sentence for...
13-16
2:45 PM

CheckIt!

GetIt?

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 2.

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CHAPTER 3

Installing and Using Software

What’s Inside?

Chapter 3 provides you with some handy tips for figuring out how to use the software you currently have and for installing new software on your PC.

- **FAQs:**

  - What are the components of an application window? 35
  - How can I find out how to use my software? 36
  - What’s the significance of software copyrights and EULAs? 37
  - How do I install software? 38
  - What about software upgrades and updates? 40
  - How do I remove software? 41
- **Hardware:** USB flash drives 42
- **Project:** Explore the user interface 45
- **Issue:** Is it legal to install this software? 48
- **QuickChecks** 49

What’s on the CD?

Chapter 3 videos and software tours show you how to use menus and toolbars to control your application software. Plus, you’ll see how to download, install, and remove software.

- Tour a typical application window 35
- Discover what open source is all about 37
- Learn how to use a setup program to install software 38
- Learn how to download and unzip software 39
- Discover the recommended way to remove software 41
- Find out how to access portable software from a USB drive 44

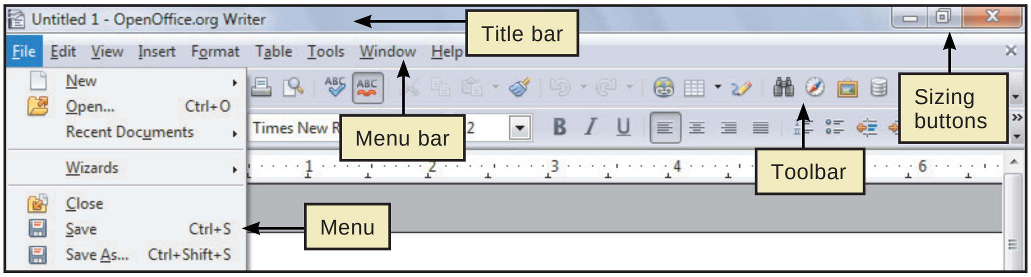
FAQ What are the components of an application window?

When you open a software application, it appears on your screen as a rectangular **application window**. The window contains a set of controls that let you work with the software and manipulate the window that contains it. The **title bar** of the window indicates the application name and contains three sizing buttons in the upper-right corner. The **Minimize button** hides the window, but leaves the program running. The **Maximize button** enlarges the window to fill the screen. The **Close button** closes the window and stops the application. A scroll bar on the side of the window helps you move a document or graphic up and down within the window.

Typically, the windows in which your applications appear include a **menu bar** that provides access to commands used to control the application. For example, when you've finished with a document in the OpenOffice Writer program, you can store it on a disk by clicking the File menu, then selecting Save from the list of command options. Below the menu bar, you might see one or more toolbars. A **toolbar** contains small pictures called toolbar buttons that provide you with shortcuts for accomplishing tasks. For example, the toolbar button that looks like a disk is a shortcut for saving a document—you can just click this button instead of clicking the File menu and then selecting the Save command.

TryIt!

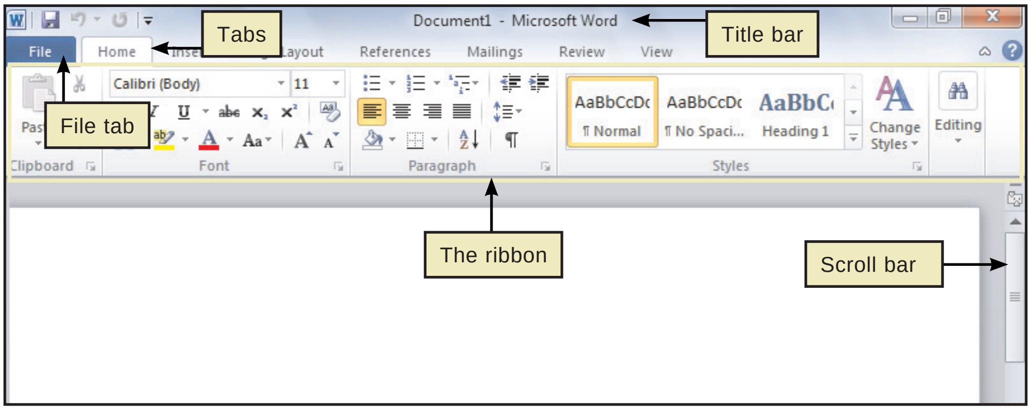
Figure 3-1


Untitled 1 - OpenOffice.org Writer
File Edit View Insert Format Table Tools Window Help
New
Open... Ctrl+O
Recent Documents
Wizards
Close
Save Ctrl+S
Save As... Ctrl+Shift+S
Times New R
Title bar
Menu bar
Sizing buttons
Toolbar
Menu

Some popular applications display a **ribbon** instead of a menu bar and toolbars. The ribbon groups related tasks under tabs. For example, on the Microsoft Office 2010 ribbon, tasks pertaining to page setup, such as selecting margins, are grouped under the Page Layout tab. The Home tab includes the most frequently used commands, such as cutting and pasting text and selecting fonts. Instead of a File menu, Office 2010 products have a File tab, located in the upper-left corner of the application window. Just like the File menu, the **File tab** has Open, Save, and Print options. Click the Try It! button to take a tour of the Office 2010 application window and learn more about using the title bar, the ribbon, sizing buttons, and the scroll bar.

TryIt!

Figure 3-2


Document1 - Microsoft Word
File
Home
References
Mailings
Review
View
Calibri (Body)
11
AaBbCcDc ¶ Normal
AaBbCcDc ¶ No Spaci...
AaBbC Heading 1
Change Styles
Editing
Clipboard
Font
Paragraph
Styles
Tabs
Title bar
File tab
The ribbon
Scroll bar

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FAQ How can I find out how to use my software?

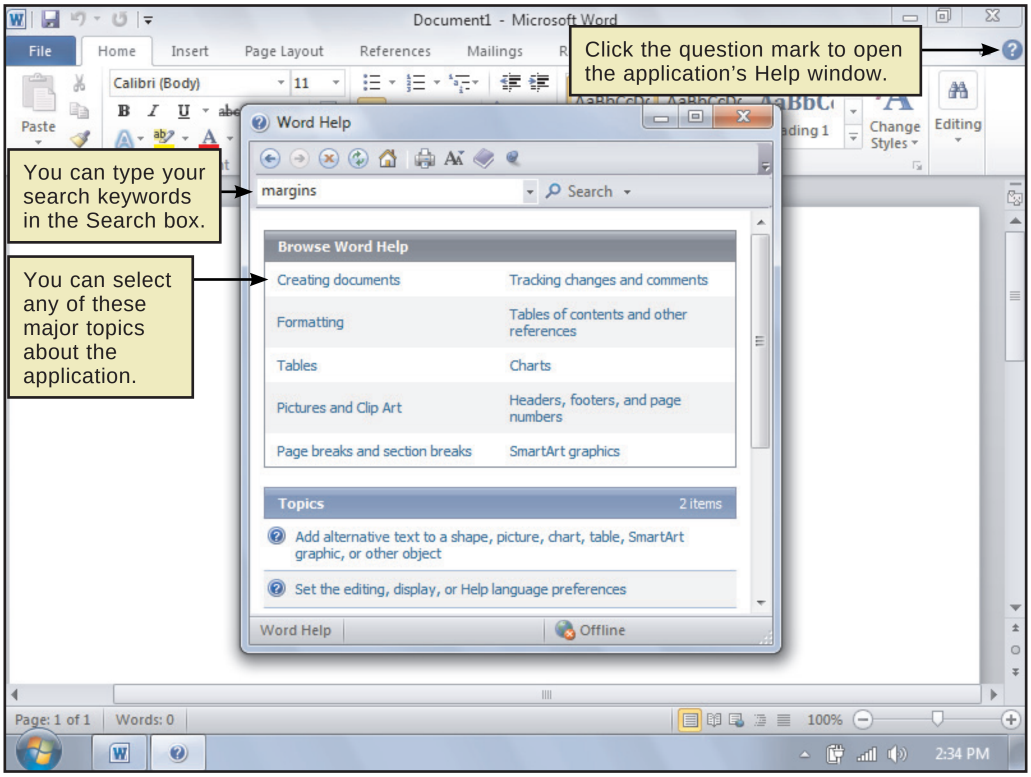
While using application software, you can access help from a variety of sources, including on-screen help, tutorials, and Web sites. The source you turn to first depends on the type of help you need.

When first learning to use an application, you might want to work through a tutorial. If your application does not include a tutorial, you might be able to find one online. For popular applications, tutorials and "how-to" books can be found in your local bookstore.

Typically, general questions about how to use software features can be best answered by on-screen help that explains features and provides step-by-step instructions for their use.

To access on-screen Help, look for a question mark icon or Help menu on the application's menu bar, toolbar, or ribbon. After you open the Help window, you can usually find information about features and procedures by typing keywords into a Search box, as shown in Figure 3-3.

Figure 3-3



margins

Browse Word Help

Creating documents	Tracking changes and comments
Formatting	Tables of contents and other references
Tables	Charts
Pictures and Clip Art	Headers, footers, and page numbers
Page breaks and section breaks	SmartArt graphics

Topics 2 items

- Add alternative text to a shape, picture, chart, table, SmartArt graphic, or other object
- Set the editing, display, or Help language preferences

Click the question mark to open the application's Help window.

You can type your search keywords in the Search box.

You can select any of these major topics about the application.

If a feature doesn't seem to work, consider checking online user groups or the software publisher's Web site for up-to-date information. You can often find answers by searching through the publisher's knowledge base or list of FAQs. This source of information is particularly useful for troubleshooting problems and making sense of error messages. To access an online knowledge base, connect to the publisher's Web site and look for a Support link.

Another option is to use a Web-based search engine, such as Google, to get help. For example, you can enter the text of an error message to find the cause of a problem and its solution.

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FAQ What's the significance of software copyrights and EULAs?

Whether you purchase software distributed on a CD, pay for a download, subscribe to a Web-based application, or get a free game, it is covered under the protective blanket of copyright law and license agreements, which can place restrictions on copying, sharing, and redistribution. A software license agreement, also called a **EULA** (end-user license agreement), is sometimes printed on the packaging, but typically appears on the screen when you first install or use the software.

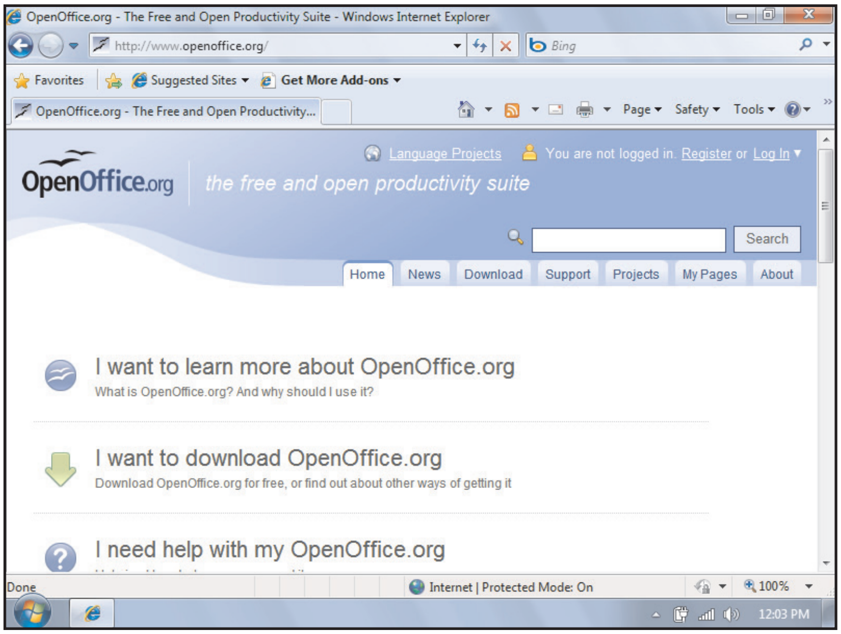
Commercial software is marketed for profit by software publishers who require strict adherence to copyright rules. Under copyright law, it is illegal to copy software except to install it and make a backup copy in case the original version stops working properly. Demo versions of commercial software are often installed on new computers. This **demoware** usually expires after a limited time if you don't purchase the full commercial version. Popular commercial software includes productivity applications such as Microsoft Office and security products such as McAfee Internet Security Suite.

Although copyright law protects all software, developers can ease the restrictions on copying by creating freeware or shareware. **Freeware** is distributed free of charge. The software developer retains the copyright, but gives blanket permission to download the software from the Internet, install it, copy it multiple times, and give copies to friends. **Shareware** is also copyrighted, but the developer allows you to install the software and share it with friends for a trial period. Shareware relies on the honor system, and you and your friends are expected to pay and register after the specified time.

Open source software is often developed as a public, collaborative effort of volunteers. It is distributed for free or for a nominal charge under a license that permits users to view, improve, and redistribute the software. Popular open source software includes a variety of applications, such as the word-processing, spreadsheet, presentation, and database modules in OpenOffice.org (usually referred to simply as OpenOffice). Other examples are a browser called Firefox and e-mail software called Thunderbird. Use the Try It! button in Figure 3-4 to take a tour of the OpenOffice.org Web site to find out how the OpenOffice community of developers manages and distributes its open source office suite.

Try It!

Figure 3-4


OpenOffice.org - The Free and Open Productivity Suite - Windows Internet Explorer
http://www.openoffice.org/
Bing
Favorites
Suggested Sites
Get More Add-ons
OpenOffice.org - The Free and Open Productivity...
Page
Safety
Tools
Language Projects
You are not logged in. Register or Log In
OpenOffice.org
the free and open productivity suite
Search
Home
News
Download
Support
Projects
My Pages
About
Done
Internet | Protected Mode: On
100%
12:03 PM

I want to learn more about OpenOffice.org
What is OpenOffice.org? And why should I use it?

I want to download OpenOffice.org
Download OpenOffice.org for free, or find out about other ways of getting it

I need help with my OpenOffice.org

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FAQ How do I install software?

Software is usually distributed on CDs or as Web downloads. When selecting new software, check the system requirements listed on the Web site or package to make sure that your PC has enough memory, adequate disk space, and the correct version of Windows.

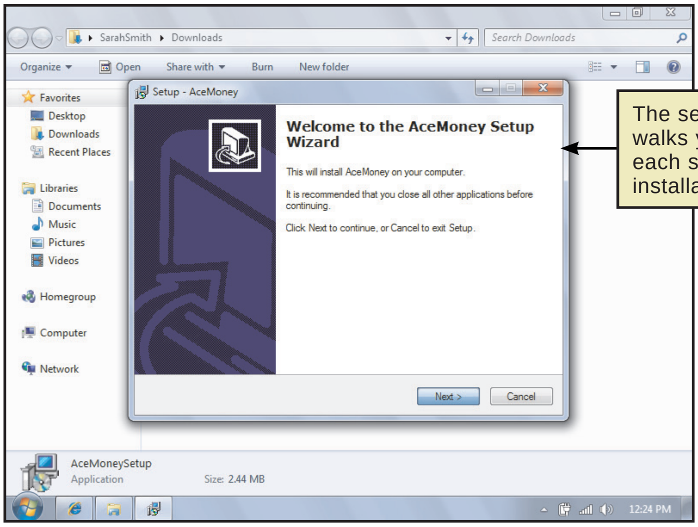
Many software applications have to be installed on your computer before you can use them. Software that's installed on your computer's hard disk is referred to as a **local application**. Local applications require hard disk space, but they tend to be full-featured and respond quickly to your commands. Microsoft Office and Adobe Photoshop are examples of local applications.

The **software installation process** for local applications copies files from the download or distribution CD to your PC's hard disk. It also adds the software's name to the All Programs menu and provides Windows with technical information needed to efficiently run the new software. This information is stored on the hard disk in a special file called the **Windows Registry** that keeps track of all the hardware and software installed on your computer. You can envision the Registry as a hotel register that keeps track of guests who check in and check out.

Some software includes a **setup module** that guides you through the installation process. When installing from a CD, insert the disc and wait a few seconds for the setup module to begin. If you're installing downloaded software, look for a file named Setup in the Downloads folder of your hard disk. Click the Try It! button in Figure 3-5 to see how setup modules work.

Try It!

Figure 3-5



Welcome to the AceMoney Setup Wizard

This will install AceMoney on your computer.

It is recommended that you close all other applications before continuing.

Click Next to continue, or Cancel to exit Setup.

The setup module walks you through each step of the installation process.

Although most software is installed as local applications, two categories of software, Web apps and portable apps, do not require installation on your computer's hard disk. A **Web application** (Web app) runs on a remote Web server somewhere on the Internet. These applications are installed on the remote server, but don't need to be installed on your local hard disk. You access this type of application using Web browser software that already exists on your computer. Popular Web apps include Hotmail and Google Docs. You'll learn more about Web apps in Chapter 8.

A **portable application**, or portable app, is designed to run from removable storage devices, such as USB flash drives and CDs. Portable apps require no Registry entries, so they can run on one computer and then be inserted into another computer and run without installation. Examples of portable apps include OpenOffice Portable and Password Safe.

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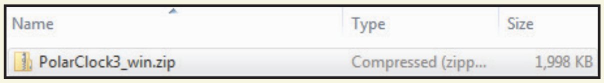
• How do I install software? (continued)

The Internet is a great source for free software and demo versions of commercial software. Before you can install and use software from the Internet, you have to **download** it, a process that transfers files from a remote computer to your PC. If downloaded software includes a setup routine, the installation process is easy. However, some downloaded software does not include a setup routine and requires manual installation that typically includes the steps in Figure 3-6. Click the Try It! button to step through the process of downloading and installing a shareware application.

Try It!

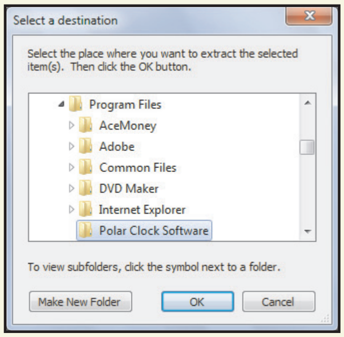
Figure 3-6

1. Download the distribution file containing the software.
2. Locate the downloaded file. Unless you specify otherwise, Windows 7 places downloaded files in your Downloads folder.
3. Software downloads are usually distributed as **compressed files** to reduce their size and download time. A compressed file might contain a single program file or several program modules. Compressed files are also referred to as **zipped files** or **packed files**. The name of a compressed file usually ends in .zip and is labeled Compressed in the Type column.



Name	Type	Size
PolarClock3_win.zip	Compressed (zipp...	1,998 KB

4. Extract (or unzip) the distribution file. You can specify where the extracted files are stored. Create a folder for the program in the Program Files folder; put the extracted files there.

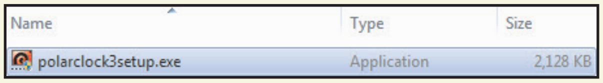


Select a destination

Select the place where you want to extract the selected item(s). Then click the OK button.

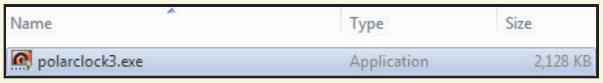
To view subfolders, click the symbol next to a folder.

5. Look in the new folder for a Setup application or one called Install. Double-click that file to complete the installation.



Name	Type	Size
polarclock3setup.exe	Application	2,128 KB

6. If a setup routine is not provided, double-click any of the files labeled Application in the Type column. When you find the file that launches the program, you might want to pin it to the Start menu or Windows taskbar.



Name	Type	Size
polarclock3.exe	Application	2,128 KB

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FAQ What about software upgrades and updates?

Periodically, software publishers produce **software upgrades** designed to replace older versions. Upgrades are often designated by a **version number** (also referred to as a revision number), such as version 1.1 or version 2.0. A software upgrade usually offers enhanced features and performance. Upgrading to a new version normally involves a fee, but is typically less costly than purchasing a completely new version.

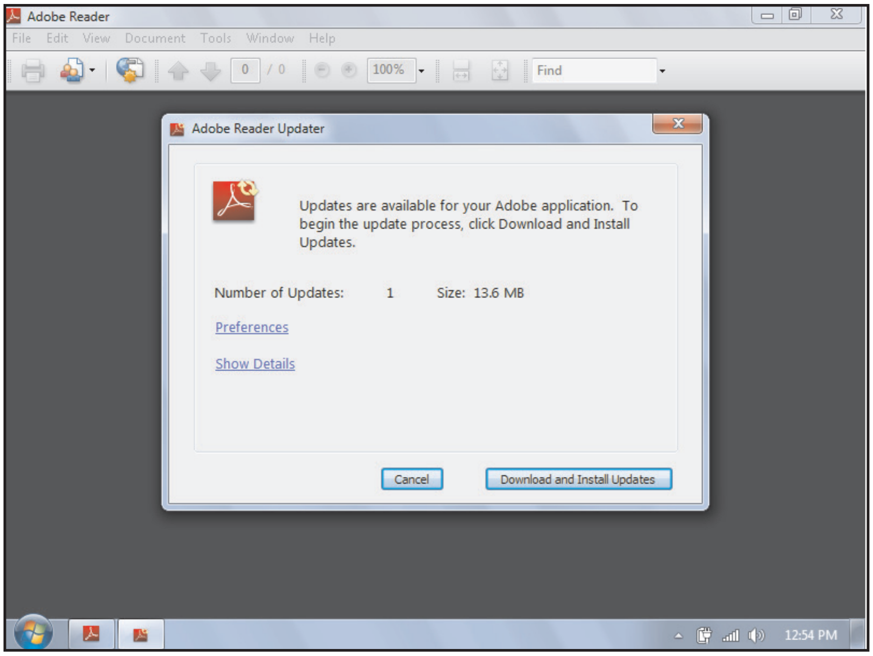
If you've registered your current software, you're likely to receive an e-mail notification when new versions are available. The procedure for installing an upgrade is usually similar to the process for installing the original version; you'll start the setup program and accept the license agreement before the software's files are copied to your computer's hard disk. To combat piracy, many software publishers require you to enter a validation code to complete an upgrade.

In between major software versions, publishers often release software updates, referred to as patches and service packs, designed to fix bugs and update security. A **software patch** is a small section of program code that replaces part of the software you currently have installed. The term **service pack**, which usually applies to operating system updates, is a set of patches that correct problems and address security vulnerabilities.

Software patches and service packs are usually free. They are typically distributed over the Internet and can automatically install themselves. When an application is configured for **automatic updates**, it periodically checks the software publisher's Web site for updates, downloads updates automatically, and installs them without user intervention. The advantage of automatic updating is convenience. The disadvantage is that changes can be made to your computer without your knowledge.

It is always a good idea to install patches and service packs when they become available. The revised code they contain often addresses security vulnerabilities; and the sooner you patch those holes, the better. If you see a message like the one in Figure 3-7, take a few moments to complete the update process so that you'll have the current and most secure version of your software application.

Figure 3-7



Updates are available for your Adobe application. To begin the update process, click Download and Install Updates.

Number of Updates: 1 Size: 13.6 MB

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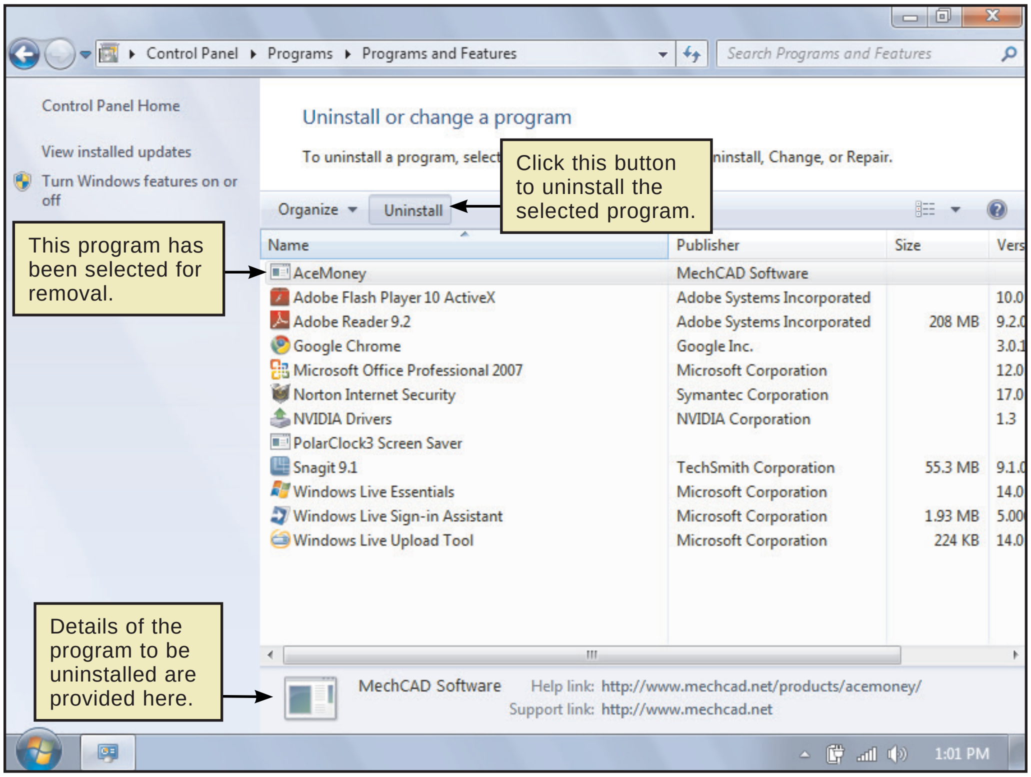
FAQ How do I remove software?

At some point, you might choose to remove software from your PC. You might want to make room on the hard disk for other programs, documents, or graphics. You might no longer need some of your software or expired demoware. You might want to replace a program with one that has a better collection of features.

The process to **uninstall software** removes programs from the hard disk, removes the program name from the All Programs menu, and updates the Registry. You'll find it quite easy to uninstall software by using the Control Panel's *Uninstall or change a program* option. You can access this option by entering "Uninstall" in the Start menu's Search box. Figure 3-8 shows you how to proceed.

Try It!

Figure 3-8



Uninstall or change a program

To uninstall a program, select … ninstall, Change, or Repair.

Name	Publisher	Size	Vers
AceMoney	MechCAD Software		
Adobe Flash Player 10 ActiveX	Adobe Systems Incorporated		10.0
Adobe Reader 9.2	Adobe Systems Incorporated	208 MB	9.2.
Google Chrome	Google Inc.		3.0.1
Microsoft Office Professional 2007	Microsoft Corporation		12.0
Norton Internet Security	Symantec Corporation		17.0
NVIDIA Drivers	NVIDIA Corporation		1.3
PolarClock3 Screen Saver			
Snagit 9.1	TechSmith Corporation	55.3 MB	9.1.
Windows Live Essentials	Microsoft Corporation		14.0
Windows Live Sign-in Assistant	Microsoft Corporation	1.93 MB	5.00
Windows Live Upload Tool	Microsoft Corporation	224 KB	14.0

MechCAD Software Help link: http://www.mechcad.net/products/acemoney/
Support link: http://www.mechcad.net

Click this button to uninstall the selected program.

This program has been selected for removal.

Details of the program to be uninstalled are provided here.

Although the uninstall process seems straightforward, your PC is very busy behind the scenes. Its major concern is to correctly update the Registry by removing entries for the software you're uninstalling. This process is not as simple as it sounds because some program modules are used by more than one software application. For example, both your word-processing software and your graphics software might use the same program module containing a collection of clip art pictures. If you uninstall the graphics software, should your PC delete the clip art module from the disk and remove its entry from the Registry? No, because then the clip art would not be available when you use your word-processing software.

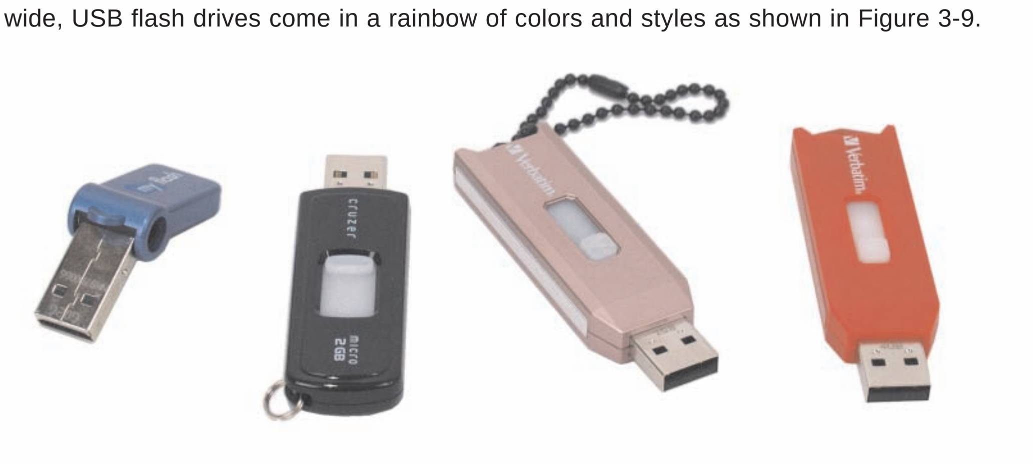
Generally, your PC should not delete shared program modules when you uninstall software. The Control Panel's Uninstall option works carefully with the list of programs in the Registry to make sure that only non-shared files are removed. In the days when computer software contained only one or two modules, you could uninstall software simply by finding the programs and deleting them. On today's PCs, however, it is best to let the Control Panel's Uninstall option handle the complexities of shared program modules and Registry updates.

Hardware

USB flash drives

A **USB flash drive** is a compact and portable solid state storage device that makes it easy to carry files and programs with you for use on computers at home, school, work, and libraries or other public access sites. USB flash drives are also referred to as UFDs, thumb drives, and jump drives. Typically about two inches long and less than an inch wide, USB flash drives come in a rainbow of colors and styles as shown in Figure 3-9.

Figure 3-9



USB flash drives offer a range of storage capacities. A typical 6 GB (gigabyte) USB flash drive far exceeds the storage capacity of a CD and rivals the capacity of a DVD. USB drives are no match, however, for the storage capacity and speed of a hard disk drive. When working with a USB drive to access large files, you might notice a performance lag.

USB flash drives use **solid state technology**, which holds data in erasable, rewritable circuitry, rather than on spinning disks or streaming tape. Solid state chips contain a grid of cells, and each cell contains two transistors that act as gates. Each gate can be open or closed. Your computer uses various combinations of open and closed gates to represent data, somewhat like Morse code uses dots and dashes to represent letters and numbers. Very little power is required to open and close the gates, which means that USB flash drives can operate by drawing a small amount of power from the computer.

The data stored on a USB drive is retained without the need for additional power, even when the device is disconnected from the computer. Because they don't need batteries or an external power cable, USB flash drives can be small and very portable.

Without moving parts, USB flash drives are immune to mechanical failures that affect CD, DVD, and hard disk drives. Solid state technology is durable and impervious to vibrations, magnetic fields, or normal temperature variations. However, USB flash drives have a limited number of erase-write cycles, which means that you can't change the data they contain an infinite number of times. Inexpensive USB drives are rated for about 10,000 cycles. As insurance against losing data, you should store copies of the files on your USB flash drive in a backup location, such as on your computer's hard disk.

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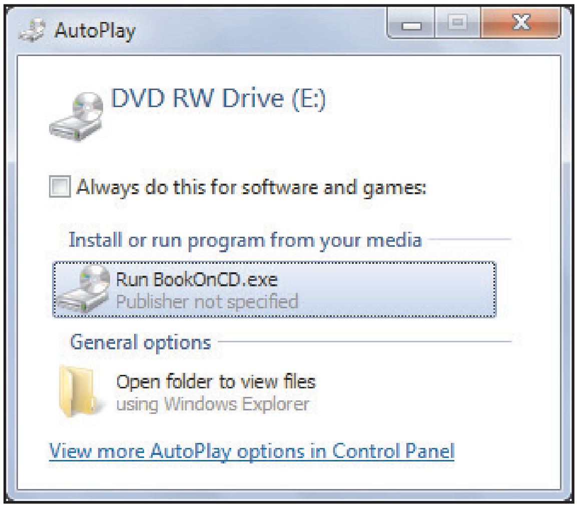
Hardware
(continued)

USB flash drives plug into a computer's **USB port**, a rectangular socket positioned on the front, side, or back of the system unit. These ports are typically labeled with the USB symbol.

When inserting a USB flash drive, make sure it is correctly aligned with the port. If the logo is printed or embossed on the drive case, the logo should be oriented up or toward you. As soon as you insert the drive, Windows detects it and opens a window similar to the one in Figure 3-10 that you can quickly use to run applications and access files.

Figure 3-10



AutoPlay

DVD RW Drive (E:)

☐ Always do this for software and games:

Install or run program from your media

Run BookOnCD.exe
Publisher not specified

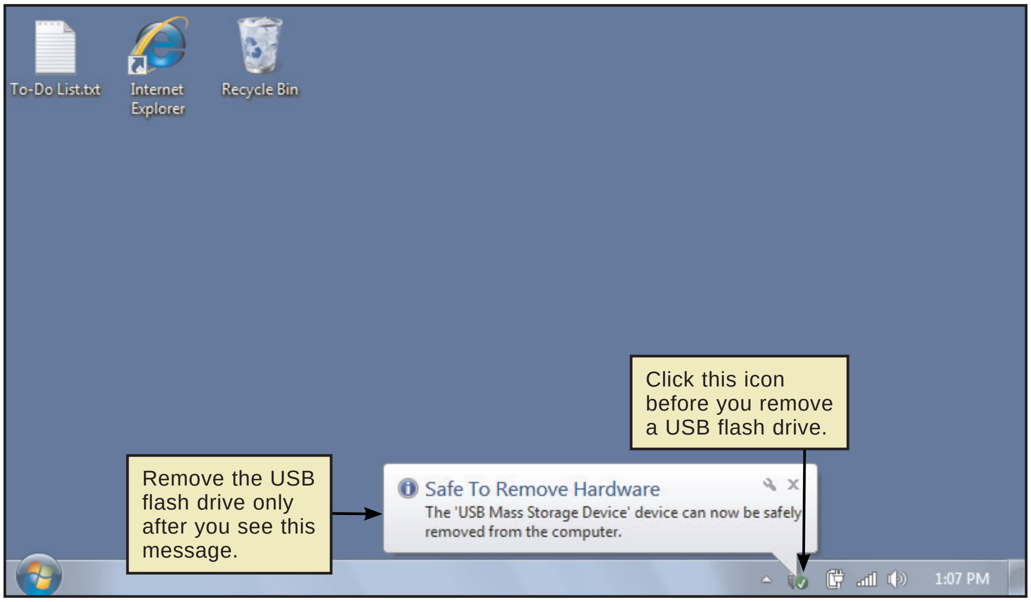
General options

Open folder to view files
using Windows Explorer

View more AutoPlay options in Control Panel

When you are ready to remove a USB flash drive from a computer, you should first click the eject icon in the notification area and wait for Windows to give you the Safe To Remove Hardware message shown in Figure 3-11.

Figure 3-11



Safe To Remove Hardware
The 'USB Mass Storage Device' device can now be safely removed from the computer.

Click this icon before you remove a USB flash drive.

Remove the USB flash drive only after you see this message.

Occasionally, Windows displays a message indicating that you should not remove the USB flash drive. Make sure that you have closed all the files that are stored on the USB drive. You might also have to close any programs that you used during your current computing session. If all else fails, you can shut down the computer and then remove the USB flash drive.

Hardware
(continued)

Not only can you access files on USB flash drives, but you can run software from them, too. If your USB drive contains your favorite portable applications, you don't have to depend on the selection of programs installed on a host computer in a school lab, at work, or in an Internet café. All you have to do to access your programs is plug your flash drive into any PC's USB port.

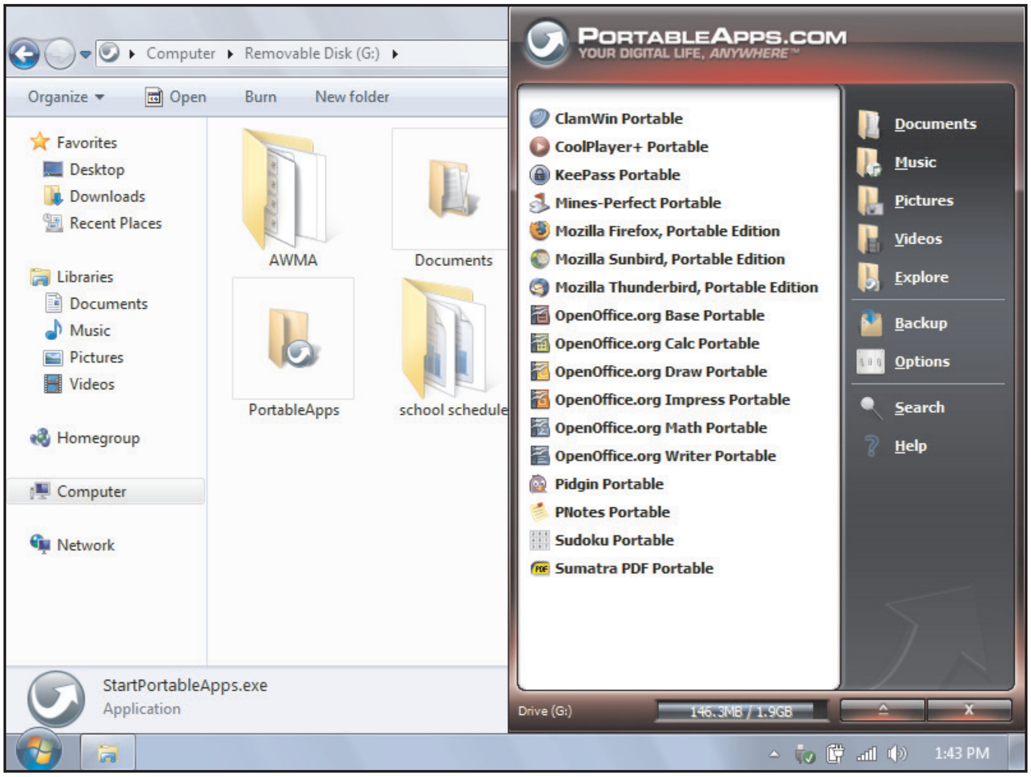
Local apps, such as Microsoft Office, have to be installed on a hard disk and cannot be run from a USB flash drive. A limited, but serviceable, selection of portable apps are available for basic computing tasks. OpenOffice Portable includes word-processing, spreadsheet, presentation, database, and drawing modules. Firefox is a portable browser that provides access to the Web. Thunderbird is a portable e-mail application. Portable graphics applications include Blender, Dia, and GIMP.

You might also consider portable security software, such as ClamWin, which can help protect your data from viruses. Plugging your USB flash drive into public computers can be a security risk. If your USB drive does not include security software, make sure that any public computer you use has it.

Because portable apps are not installed, Windows does not display their names on the Start menu. You can run portable apps manually as shown in Figure 3-12. You can also pin portable apps to the Start menu, desktop, or taskbar for easy access. Click the Try It! button to find out how.

Try It!

Figure 3-12


Computer ▸ Removable Disk (G:) ▸
Organize ▾
Open
Burn
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
Network
AWMA
Documents
PortableApps
school schedule
StartPortableApps.exe
Application
PORTABLEAPPS.COM
YOUR DIGITAL LIFE, ANYWHERE™
ClamWin Portable
CoolPlayer+ Portable
KeePass Portable
Mines-Perfect Portable
Mozilla Firefox, Portable Edition
Mozilla Sunbird, Portable Edition
Mozilla Thunderbird, Portable Edition
OpenOffice.org Base Portable
OpenOffice.org Calc Portable
OpenOffice.org Draw Portable
OpenOffice.org Impress Portable
OpenOffice.org Math Portable
OpenOffice.org Writer Portable
Pidgin Portable
PNotes Portable
Sudoku Portable
Sumatra PDF Portable
Documents
Music
Pictures
Videos
Explore
Backup
Options
Search
Help
Drive (G:)
146.3MB / 1.9GB
X
1:43 PM

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Project

Explore the user interface

In this chapter, you learned about using application windows and installing application software. You examined an application's window and its controls, which you can click to trigger specific actions. You were taught various ways of learning how to use an application, such as going through tutorials and accessing an application's online Help resources.

When you have completed this project, you should be able to:

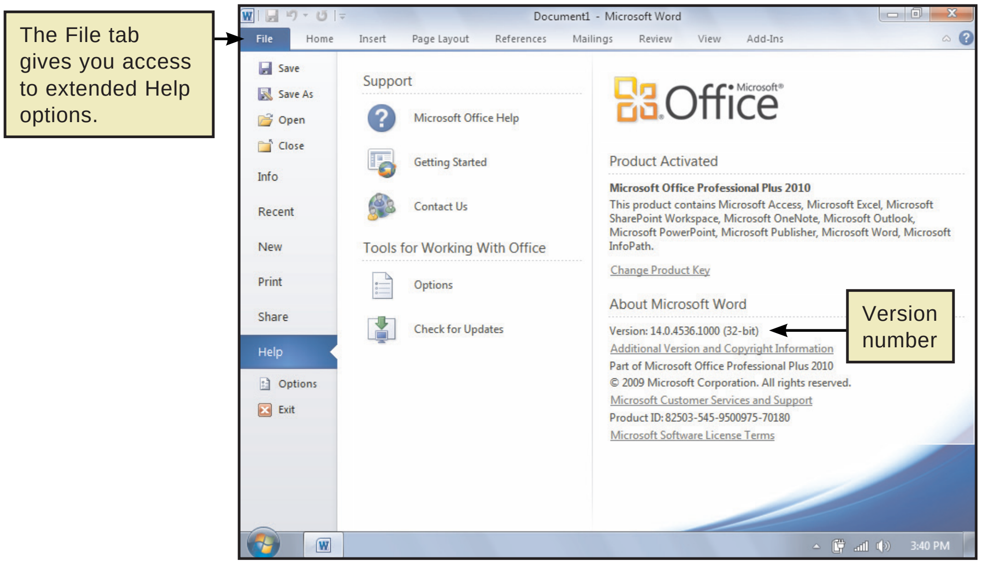
- Identify the elements in a word processor's user interface.
- Compare and contrast the user interfaces of various applications.
- Use ScreenTips to identify toolbar and ribbon buttons.
- Use on-screen Help and the Open, Save, and Print commands of several applications.

Requirements: This project requires Windows 7, Paint, Microsoft Office Word or any other word processor, Adobe Reader software, and three other applications of your choice.

The deliverable for Project 3 is a document containing the following:

1. Your word processor's name and version number
2. A list of menu titles or the ribbon's tab titles
3. A list of five word-processing tasks, and the control used to accomplish each task
4. A description of the ¶ button based on the ScreenTip
5. A list of five ScreenTips
6. Two screenshots comparing the user interfaces of your word processor and Adobe Reader
7. A comparison of how you do the following in three different applications: change a window's size, access online Help, print a file, and exit the application

1. Open the word processing software you use most frequently. Start a new document with the title **Project 3 [Your Name]**. Record the name of your word processing software and its version number. You can usually find this information by clicking Help on the menu bar and then selecting About. If the application has no menu bar but has a File tab, click the File tab, and then click Help.


Document1 - Microsoft Word
File
Home
Insert
Page Layout
References
Mailings
Review
View
Add-Ins
Save
Save As
Open
Close
Info
Recent
New
Print
Share
Help
Options
Exit
Support
Microsoft Office Help
Getting Started
Contact Us
Tools for Working With Office
Options
Check for Updates
Microsoft® Office
Product Activated
Change Product Key
About Microsoft Word
Additional Version and Copyright Information
Microsoft Customer Services and Support
Microsoft Software License Terms
3:40 PM

The File tab gives you access to extended Help options.

Microsoft Office Professional Plus 2010

This product contains Microsoft Access, Microsoft Excel, Microsoft SharePoint Workspace, Microsoft OneNote, Microsoft Outlook, Microsoft PowerPoint, Microsoft Publisher, Microsoft Word, Microsoft InfoPath.

Version: 14.0.4536.1000 (32-bit)

Part of Microsoft Office Professional Plus 2010

© 2009 Microsoft Corporation. All rights reserved.

Product ID: 82503-545-9500975-70180

Version number

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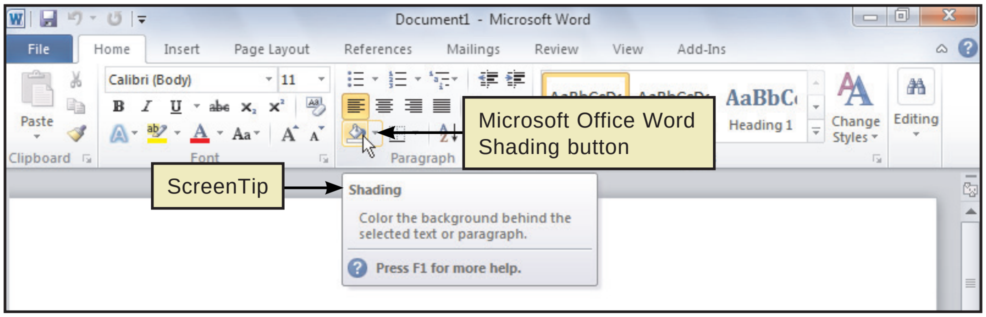
• Explore the user interface (continued)

2. Examine the user interface for your word processing software. If it has a menu bar, add a list of the menu titles to the Project 3 document. If the user interface has a ribbon, list the tab titles.

3. Consider how intuitive your word processing software is to use. For example, if you want to adjust the margins, is it easy to guess which menu or tab to use? List five word processing tasks that you typically use. For each task, describe the menu, toolbar button, or ribbon control that you use.

4. It's not always easy to identify or remember what task will be performed when you click a toolbar or ribbon button. A button for a particular task might differ from one application to another. A ScreenTip is descriptive text that appears when you hover the pointer on a button. Hover on the ¶ button and write down the description that is displayed.

5. Look for other controls that are difficult to identify without a ScreenTip. In the Project 3 document, list ScreenTips for five controls whose function is difficult to identify without viewing the ScreenTip.


Document1 - Microsoft Word
File
Home
Insert
Page Layout
References
Mailings
Review
View
Add-Ins
Paste
Clipboard
Calibri (Body)
11
Font
Paragraph
AaBbCc
Heading 1
Change Styles
Editing

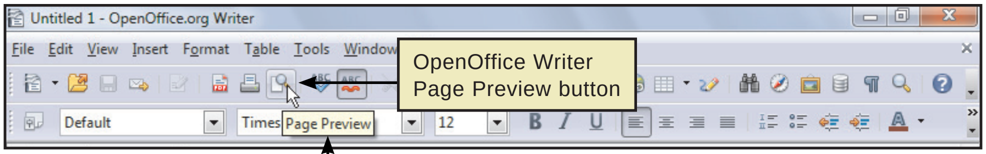
Microsoft Office Word Shading button

ScreenTip

Shading

Color the background behind the selected text or paragraph.

Press F1 for more help.


Untitled 1 - OpenOffice.org Writer
File
Edit
View
Insert
Format
Table
Tools
Window
Default
Times
12

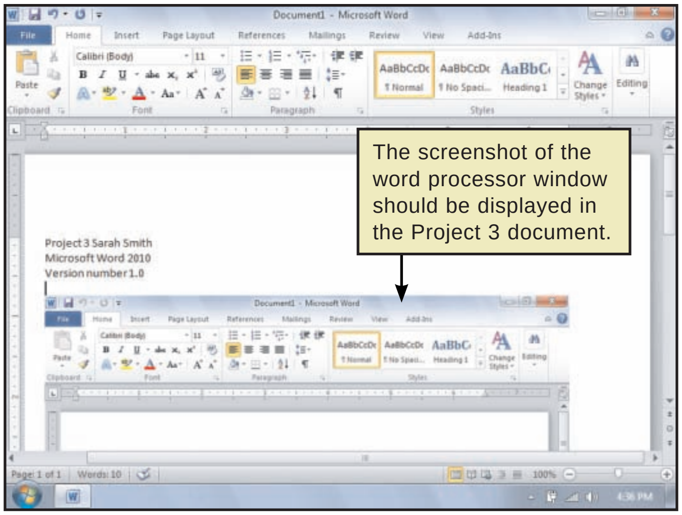
OpenOffice Writer Page Preview button

Page Preview

ScreenTip

• Explore the user interface (continued)

6. Your next task is to compare your word processor's user interface to the user interface for Adobe Reader. You can record your comparisons along with screenshots for each application. To take a screenshot of the word processor window, press the PrtSc or Print Screen key on your keyboard. Paste the screenshot into the Project 3 document.

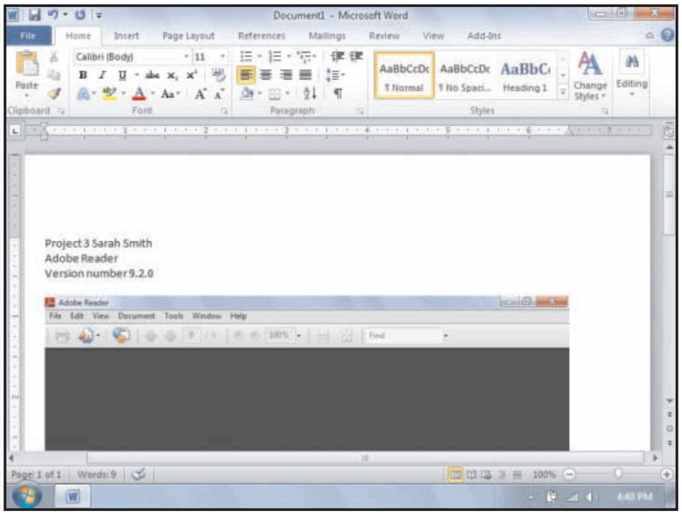


Project 3 Sarah Smith
Microsoft Word 2010
Version number 1.0

The screenshot of the word processor window should be displayed in the Project 3 document.

Document1 - Microsoft Word
File
Home
Insert
Page Layout
References
Mailings
Review
View
Add-Ins
Paste
Clipboard
Font
Paragraph
Styles
Change Styles
Editing
Page: 1 of 1
Words: 10
100%

7. Next, start Adobe Reader. If you cannot locate this application on the Start menu, you can download it free of charge from www.adobe.com/products/reader. Take a screenshot of the Adobe Reader window and then paste it into the Project 3 document.



Project 3 Sarah Smith
Adobe Reader
Version number 9.2.0

Document1 - Microsoft Word
Adobe Reader
File
Edit
View
Document
Tools
Window
Help
Page: 1 of 1
Words: 9
100%

8. Find three similarities and three differences between the two interfaces. If your word processor allows you to overlay callouts or text on images, you can indicate similarities and differences directly on the screenshots. As an alternative, you can simply list the similarities and differences under the screenshots.

9. Explore the user interfaces of three additional applications. Compare and contrast how you would accomplish the following tasks in each application:
a. Change the size of the application's window
b. Access online Help
c. Print a file
d. Exit the application

10. Save the Project 3 document as **Project 3 [Your Name]**. To submit the project, print the document or send it electronically as specified by your instructor.

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Issue

Is it legal to install this software?

Software is easy to steal. You don't have to walk out of a Best Buy store with a $495 DVD Workshop software box under your shirt. You can simply borrow your friend's DVD Workshop distribution CDs and install a copy of the program on your computer's hard disk. It seems so simple that it couldn't be illegal. But it is.

Piracy takes many forms. End-user piracy includes friends loaning distribution disks to each other and installing software on more computers than the license allows. Although it is perfectly legal to lend a physical object, such as a sweater, to a friend, it is not legal to lend digital copies of software and music because, unlike a sweater that can be worn by only one person at a time, copies of digital things can be simultaneously used by many people.

Software counterfeiting is the large-scale illegal duplication of software distribution media, and, sometimes, even its packaging. According to Microsoft, many software counterfeiting groups are linked to organized crime and money-laundering schemes that fund a diverse collection of illegal activities, such as smuggling, gambling, extortion, and prostitution. Counterfeit software is sold in retail stores and through online auctions—often the packaging looks so authentic that buyers have no idea they have purchased illegal goods.

Internet pirates use the Web as a way to illegally distribute unauthorized software. In Net jargon, the terms "appz" and "warez" (pronounced as "wares" or "war EZ") refer to pirated software. Some warez have even been modified to eliminate serial numbers, registration requirements, expiration dates, or other forms of copy protection. Web sites, peer-to-peer file-sharing networks, and auction sites sell or distribute hundreds of thousands of pirated software products.

In many countries, including the United States, software pirates are subject to civil lawsuits for monetary damages and criminal prosecution, which can result in jail time and stiff fines. Nonetheless, software piracy continues to have an enormous impact. According to a recent Business Software Alliance (BSA) and IDC Global Software Piracy Study, $130 billion of software was legitimately purchased worldwide, but software worth a whopping $53 billion was pirated.

Some analysts suggest that people need more education about software copyrights and the economic implications of piracy. Other analysts believe that copyright enforcement must be increased by implementing more vigorous efforts to identify and prosecute pirates.

What do you think?

1. Have you ever used pirated software? ○ Yes ○ No ○ Not sure

2. Do you think most people try to comply with the terms of software license agreements? ○ Yes ○ No ○ Not sure

3. If you discovered pirated software in use at your school or office, would you report it? ○ Yes ○ No ○ Not sure

Save It!

QuickCheck A

1. True or false? Local apps are designed to run from a computer's hard disk and have to be installed. ☐
2. ☐ applications are designed to run on removable media such as USB flash drives, CDs, and DVDs.
3. A file called the Windows ☐ keeps track of the hardware and software installed on your PC.
4. Many software products can be ☐ from the Internet, a process that copies a file from an Internet server to your computer.
5. ☐ law and license agreements restrict the copying, sharing, and redistribution of software.

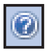
CheckIt!

QuickCheck B

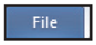
Type the letter of the object that helps you accomplish each of the tasks listed below.

1. Open, save, or print a file ☐
2. Open the Help window ☐
3. Maximize a window ☐
4. Minimize a window ☐
5. Look for a specific word or term in online Help ☐
6. Close a window ☐

A



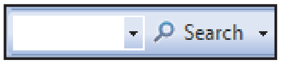
B



C

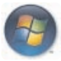
D

E



F

G



H

CheckIt!

GetIt?

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 3.

CHAPTER 4

File Basics

What's Inside?

All of the documents, pictures, and music that you download or create with your PC are stored as files. Chapter 4 helps you understand how to best name your files, where to store them, and how to open them.

- **FAQs:**
  - What is a file? 51
  - What do I need to know about file names? 52
  - How do I create and save files? 53
  - How do I open files? 54
  - What if Windows opens the wrong application? 55
- **Hardware:** Hard disk drives 56
- **Project:** Open and save files 59
- **Issue:** How permanent are electronic files? 62
- **QuickChecks** 63

What's on the CD?

Don't miss the Chapter 4 screen tours that provide all the basics about files and storage technologies.

- Take a look at file properties 51
- Walk through the process of creating and saving a file 53
- Discover lots of ways to open files 54
- Make sure Windows opens the right application 55
- See what goes on inside a hard disk drive 56
- Find out how to tune up your computer's hard disk 58

FAQ What is a file?

A **file** is a collection of data that has a name and is stored on a hard disk, CD, DVD, USB flash drive, or other storage device. Each document, graph, or picture you create with application software is stored as a file. Web pages you view from the Internet are also stored as files, as is music that you download from online music stores.

Files can be divided into two categories: executable files and data files. An **executable file** is a program module containing instructions that tell your computer how to perform specific tasks. Your computer "executes" these instructions to complete tasks such as sorting lists, searching for information, printing, or making calculations. Your computer's All Programs menu displays a list of software; when you select one of these programs, the computer runs its executable file.

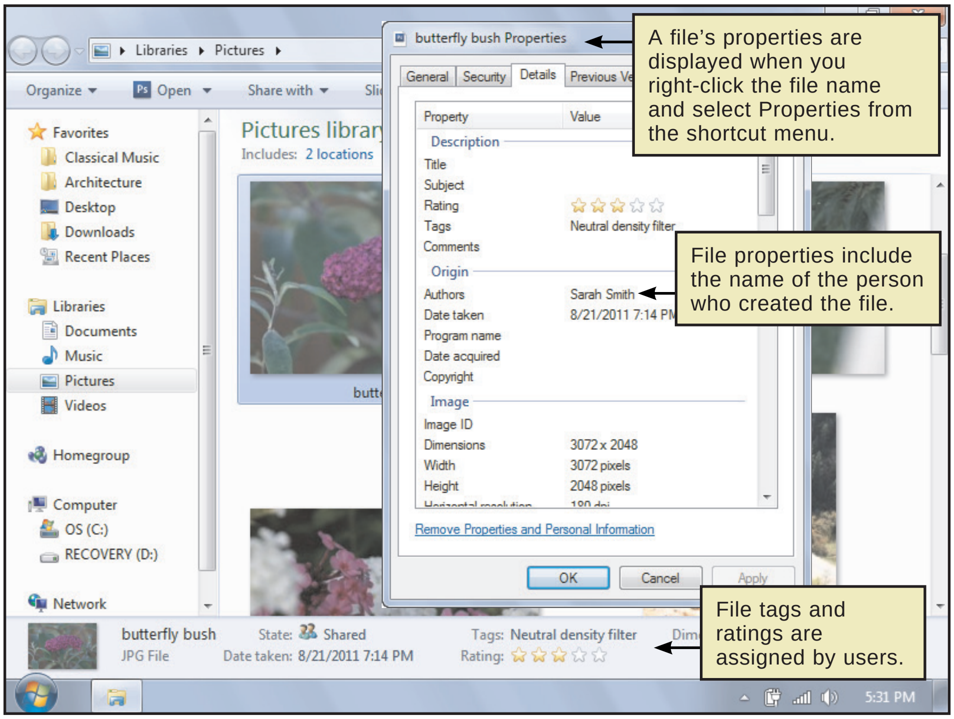
A **data file** contains words, numbers, and pictures you can manipulate. You create data files using application software. For example, a document created using word-processing software is a data file.

Every data file or executable file has **file properties** that describe its name, type, location, and size. A file's properties also include the dates when the file was created, modified, and last accessed. Some files are designated as read-only or hidden. A **read-only file** cannot be modified or deleted. A **hidden file** does not appear in file lists and cannot be used unless you know its name and location. Some files are marked for archiving to identify them for backup programs. Other files can be protected by passwords to prevent unauthorized access.

Some file properties are assigned by the operating system. Files created in Windows 7 can also have descriptive **file tags** assigned by users. For example, a photographer might assign tags such as "Nikon" and "Neutral density filter" to the file that holds a digital photo. Figure 4-1 illustrates the tags associated with a typical file. Click the Try It! button to find out how to view a file's properties. You might be surprised by some of the information that's included.

Try It!

Figure 4-1


Libraries ▸ Pictures ▸
Organize
Open
Share with
Favorites
Classical Music
Architecture
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
OS (C:)
RECOVERY (D:)
Network
Pictures library
Includes: 2 locations
General
Security
Details
Previous Ve
Remove Properties and Personal Information
OK
Cancel
Apply
5:31 PM

butterfly bush Properties

Property	Value
Description	
Title	
Subject	
Rating	★★★☆☆
Tags	Neutral density filter
Comments	
Origin	
Authors	Sarah Smith
Date taken	8/21/2011 7:14 PM
Program name	
Date acquired	
Copyright	
Image	
Image ID	
Dimensions	3072 x 2048
Width	3072 pixels
Height	2048 pixels

butterfly bush
JPG File
State: Shared
Date taken: 8/21/2011 7:14 PM
Tags: Neutral density filter
Rating: ★★★☆☆

A file's properties are displayed when you right-click the file name and select Properties from the shortcut menu.

File properties include the name of the person who created the file.

File tags and ratings are assigned by users.

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FAQ What do I need to know about file names?

Every computer file has a **file name** that is used to locate it from among the hundreds or thousands of files on a storage device. Effective file names describe their contents. Names can include multiple words, numbers, and spaces. Most people tend to apply the same capitalization for file names as they would for titles, using uppercase for the first letter of every word except articles and prepositions.

Although some computing tasks are **case sensitive**, which means they distinguish between upper case and lower case letters, Windows file naming is not case sensitive. You can use uppercase and lowercase letters and Windows will maintain the case you specify. However, if you name a file “Sage” you cannot name another file “SAGE” because Windows considers those file names the same.

Some words are not allowed as file names and some symbols cannot be used. When naming files, keep the following file naming conventions in mind.

Figure 4-2

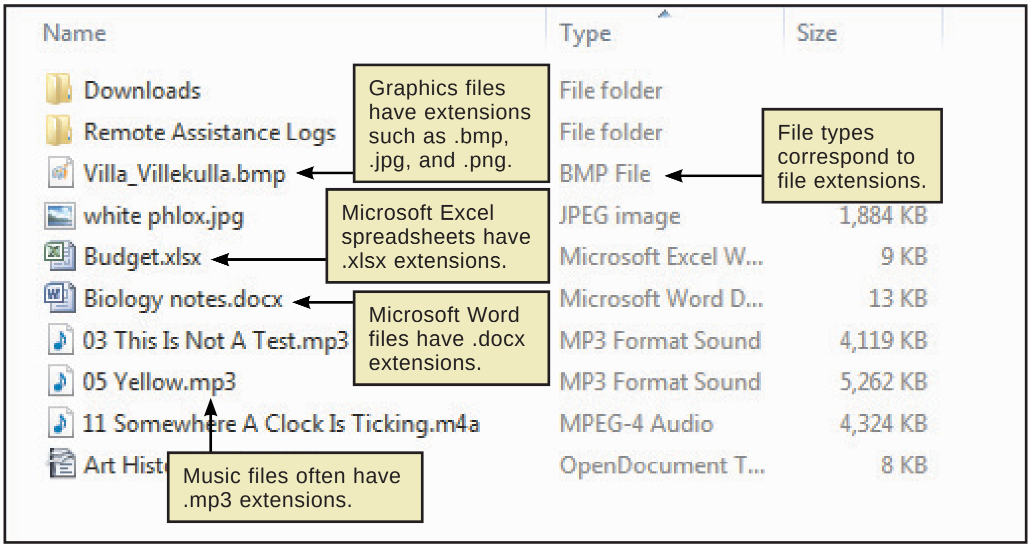
Symbols not allowed	File names not allowed	Maximum length
/ < > ” \ : | * ?	Aux, Com1, Com2, Com3, Com4, Con, Lpt1, Lpt2, Prn, Nul	256

When a file is created, a file extension is typically added to the file name. A **file extension** is a set of characters added to a file name to indicate the file’s contents and origin. For example, Microsoft Word adds .docx extensions to the file names of documents. OpenOffice Writer adds .odt extensions. A file extension is separated from the main file name with a period but no spaces, as in Sage.docx. File extensions are typically three or four characters in length.

Windows does not display file extensions unless you’ve turned them on. You can change this setting on your computer by typing “file extensions” in the Start menu’s Search box and then selecting the option to *Show or hide file extensions*.

Even if extensions are hidden, Windows displays a **file type** (also called a **file format**) based on the extension. A document created with Microsoft Word is classified as a DOC file. You can see how that file type is related to the file’s .docx extension. A document created with OpenOffice Writer would be classified as an OpenDocument Text file based on its .odt file extension. Before you open a file, pay attention to the file type to get an idea of what a file contains and which application is required to work with it.

Figure 4-3



Name	Type	Size
Downloads	File folder	
Remote Assistance Logs	File folder	
Villa_Villekulla.bmp	BMP File	
white phlox.jpg	JPEG image	1,884 KB
Budget.xlsx	Microsoft Excel W...	9 KB
Biology notes.docx	Microsoft Word D...	13 KB
03 This Is Not A Test.mp3	MP3 Format Sound	4,119 KB
05 Yellow.mp3	MP3 Format Sound	5,262 KB
11 Somewhere A Clock Is Ticking.m4a	MPEG-4 Audio	4,324 KB
Art Hist	OpenDocument T...	8 KB

Graphics files have extensions such as .bmp, .jpg, and .png.

File types correspond to file extensions.

Microsoft Excel spreadsheets have .xlsx extensions.

Microsoft Word files have .docx extensions.

Music files often have .mp3 extensions.

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FAQ How do I create and save files?

The most common way to create files is by using application software; for example, using Microsoft Word to create a document. Most applications have a New option that opens a work area where—depending on the application—you can enter text, numbers, shapes, or musical notes. As you create documents, graphs, music, and pictures, your computer holds the data in memory. When you're ready to save a file by transferring it to more permanent disk or USB flash drive storage, use the Save or Save As command.

The first time you save a file, you are required to give the file a name and specify a storage location. Each storage device on your PC is identified by a unique **device letter**. Device letters are followed by a colon (:) and a backslash (\); for example, your computer's hard disk is listed as C: or C:\. When you save a file, you can select a storage device from a list or enter the device letter as you type the file name.

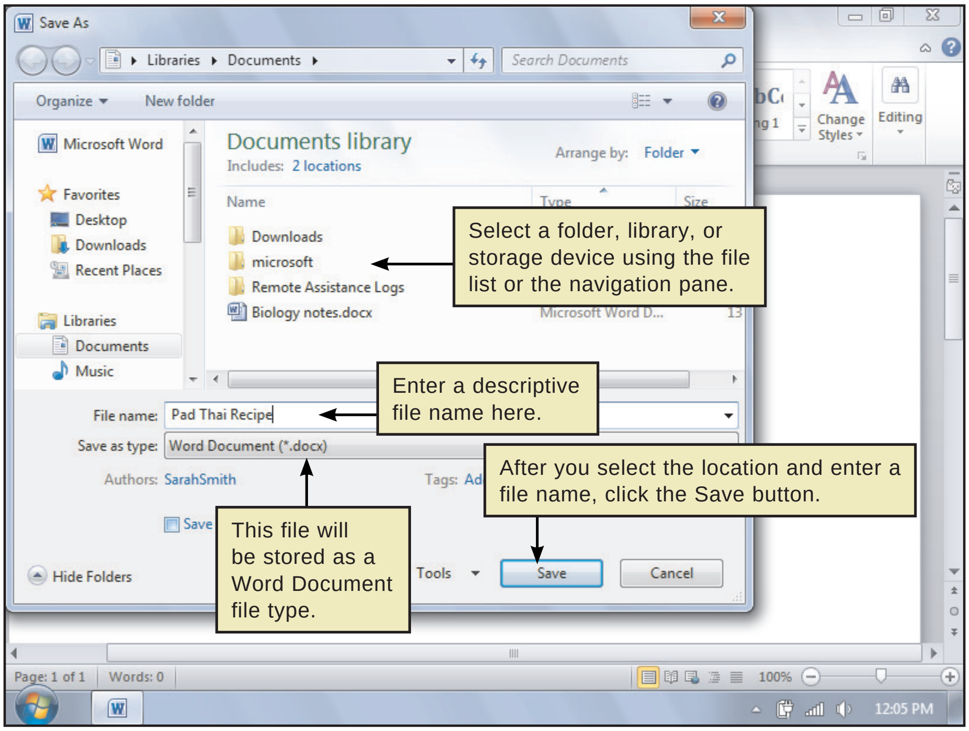
Storage devices can hold thousands of files, and the use of folders and libraries allows you to group files for easy retrieval. Think of a **folder** as a container that can hold a set of files, and a **subfolder** as a container within a folder. Windows 7 preconfigures your computer's hard disk with a set of **personal folders** for each user. The folders designed to store your data files are called My Documents, My Pictures, My Videos, My Music, Downloads, and so on. Most experts recommend that you use these folders for the bulk of your files.

Windows 7 also provides each user with a set of **libraries** that have names very similar to those of your personal folders: Documents, Pictures, Music, and Videos. Libraries can help you access files from several different folders and subfolders. Think of a library as a set of links to your files.

As an alternative to saving files in folders, you can save them on the Windows desktop—a handy idea for files that you access frequently, such as a to-do list. Click the Try It! button to walk through the process of saving a newly created document.

Try It!

Figure 4-4


Save As
Libraries ▸ Documents ▸
Search Documents
Organize ▾
New folder
Microsoft Word
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Documents library
Includes: 2 locations
Arrange by: Folder ▾
Name
Type
Size
Downloads
microsoft
Remote Assistance Logs
Biology notes.docx
Microsoft Word D...
Tags: Ad
Save
Hide Folders
Tools
Save
Cancel
Change Styles
Editing
Page: 1 of 1
Words: 0
100%
12:05 PM

File name: Pad Thai Recipe

Save as type: Word Document (*.docx)

Authors: SarahSmith

Select a folder, library, or storage device using the file list or the navigation pane.

Enter a descriptive file name here.

After you select the location and enter a file name, click the Save button.

This file will be stored as a Word Document file type.

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FAQ How do I open files?

To view or modify a file, you have to first open it. You can open files from within applications, from the desktop, from the Search box, or from a jump list. You can use any of the following methods, depending on what is convenient:

- **Application software.** Most application software includes an Open command that helps you locate a file by choosing the storage device and folder in which the file is stored. Once you've selected a location, your application displays a list of files that have compatible file types. For example, Microsoft Word's Open command lists only DOC files, so that you don't have to sift through a long list that includes graphics, spreadsheet, and music files.

- **Windows desktop.** If you have saved a file, such as a to-do list, on the Windows desktop, you'll find an icon there that you can double-click to open the file. Double-clicking a file's desktop icon automatically starts the application software required to view and revise the file.

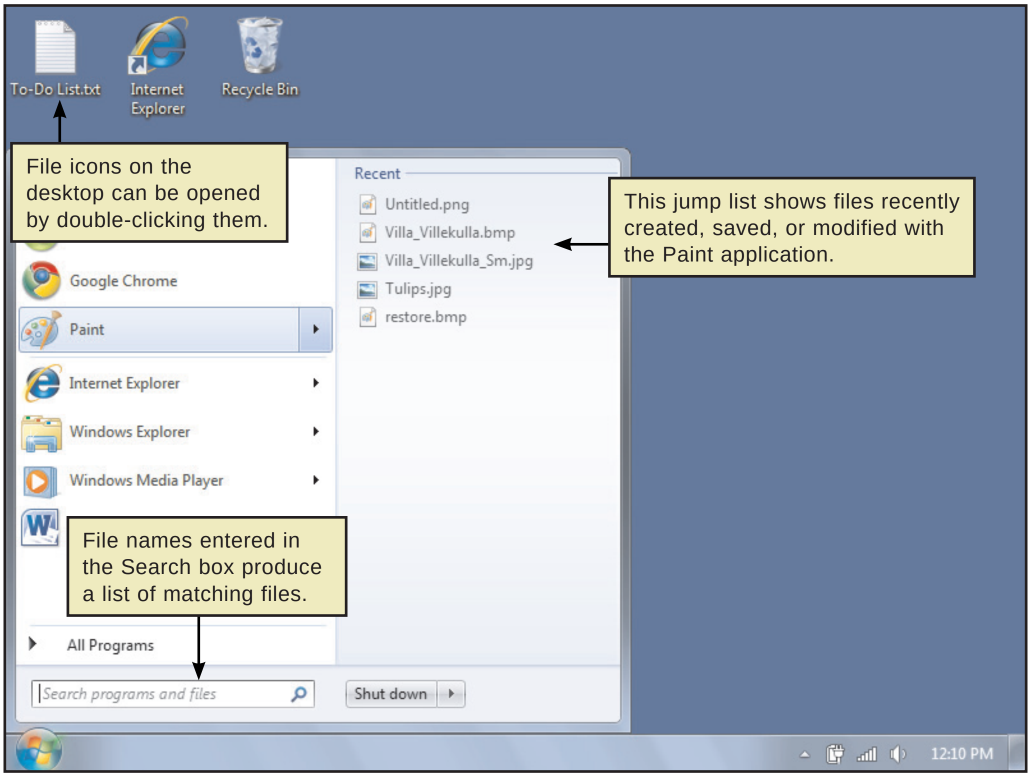
- **Search box.** You can open the Start menu and type all or part of a file name in the Search box. Windows displays the names of files that match, and you can click the one you want. As with desktop icons, the application software required to view and edit the file starts automatically.

- **Jump list.** Applications displayed on the Start menu and taskbar include a **jump list** that appears when your mouse hovers over the application's icon. The jump list displays a list of files recently created, viewed, or saved using that application. Clicking a file from the jump list starts the application and opens the file.

Click the Try It! button for a tour of various handy ways to open files.

Try It!

Figure 4-5


To-Do List.txt
Internet Explorer
Recycle Bin
Recent
Untitled.png
Villa_Villekulla.bmp
Villa_Villekulla_Sm.jpg
Tulips.jpg
restore.bmp
Google Chrome
Paint
Internet Explorer
Windows Explorer
Windows Media Player
All Programs
Search programs and files
Shut down
12:10 PM

File icons on the desktop can be opened by double-clicking them.

This jump list shows files recently created, saved, or modified with the Paint application.

File names entered in the Search box produce a list of matching files.

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FAQ What if Windows opens the wrong application?

Suppose you want to work on a photo called Vacation that is a JPEG image file type. You have Adobe Photoshop installed on your computer and that's the application you expect Windows to select because it is designed for editing photo images. Windows, however, opens its built-in Photo Viewer software. Why?

Windows keeps a list of file types and their corresponding default programs. A **default program** is the one that Windows uses when you open a particular file type. The link between a file type and its default program is sometimes called an **association**.

Often the default program is the program that was used to create a file. So, as you might expect, Microsoft Word is the default program for the DOC file type. Whenever you open a DOC file, Windows automatically opens Microsoft Word so that you can view and edit the file.

In some cases, however, the default program is not so obvious. You can use Paint, Photoshop, Photo Viewer, and many other graphics applications to work with JPEG image file types. If you have several of these applications installed on your computer, how does Windows know which one to use? It uses the application from the default program list. In some cases, the default program is not the one you'd like to use.

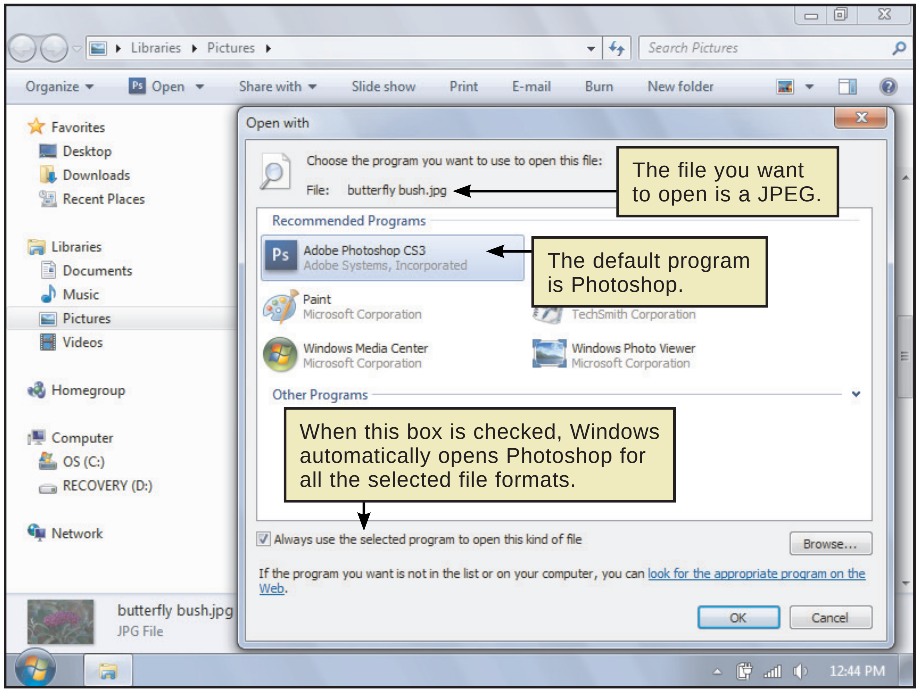
You can open files using an application other than the one on the default program list in the following ways:

- Right-click the file name and select the *Open with* option. Windows displays a list of applications and you can choose the one you want to use to view and edit your file. This method works well for occasional use.
- You can change the default programs list so that Windows automatically opens the program of your choice every time you open a particular file type.

Figure 4-6 illustrates the default program list. Click the Try It! button to find out more about this important feature of Windows.

Try It!

Figure 4-6


Libraries ▸ Pictures ▸
Search Pictures
Organize ▾
Open ▾
Share with ▾
Slide show
Print
E-mail
Burn
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
OS (C:)
RECOVERY (D:)
Network
butterfly bush.jpg
JPG File
Open with
Recommended Programs
Adobe Photoshop CS3
Adobe Systems, Incorporated
Paint
Microsoft Corporation
TechSmith Corporation
Windows Media Center
Microsoft Corporation
Windows Photo Viewer
Microsoft Corporation
Other Programs
Browse...
OK
Cancel
12:44 PM

Choose the program you want to use to open this file:

File: butterfly bush.jpg

☑ Always use the selected program to open this kind of file

If the program you want is not in the list or on your computer, you can look for the appropriate program on the Web.

The file you want to open is a JPEG.

The default program is Photoshop.

When this box is checked, Windows automatically opens Photoshop for all the selected file formats.

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Hardware

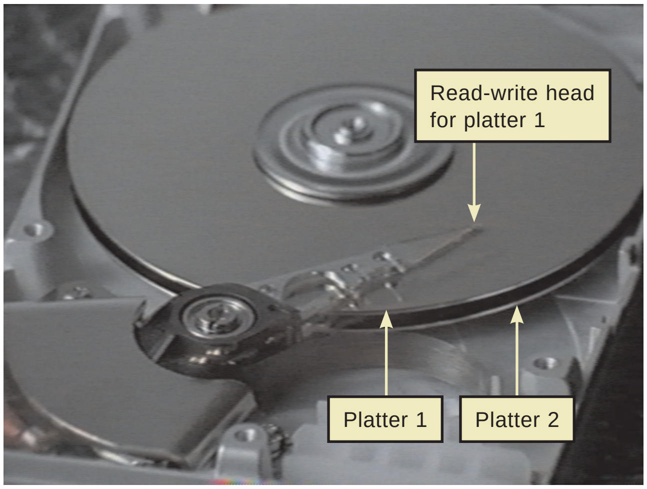
Hard disk drives

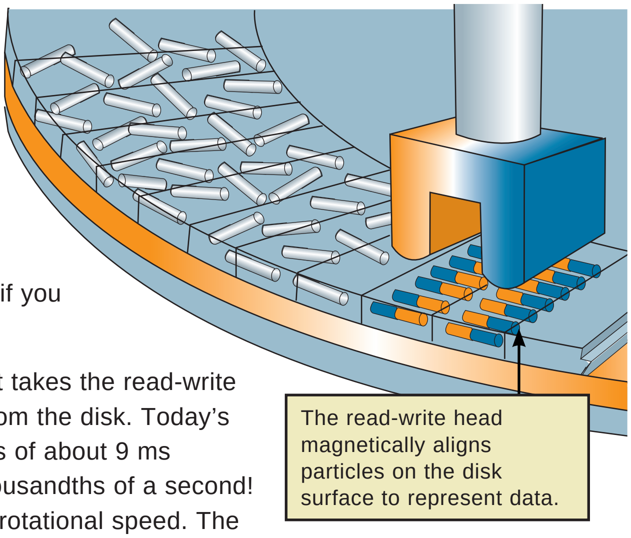
In this chapter, you've learned about creating, saving, and opening files. Most of those files are stored on your PC's hard disk. A **hard disk** is a circular, rigid storage medium that is typically made of aluminum or glass and coated with metallic particles. One or more of these disks and their corresponding read-write heads are sealed inside a hard disk drive. The hard disks inside the drive are also called **platters**. A typical PC hard disk drive usually contains two to four platters.

Hard disks use **magnetic storage technology**, in which an electronic device called a **read-write head** magnetizes microscopic metallic particles on the disk surface. The read-write head also senses the particles' polarity to retrieve data.

Play It!

Figure 4-7




The read-write head magnetically aligns particles on the disk surface to represent data.

Magnetic storage is fast and inexpensive, characteristics that make hard disk drives the primary storage device on most computers. A typical hard disk drive holds 250 GB of data—that's 250 billion letters, numbers, or symbols. Drives with 1–2 TB (terabyte) capacities are available if you need even more storage space.

Access time is the average time it takes the read-write heads to locate and collect data from the disk. Today's hard disk drives have access times of about 9 ms (milliseconds). That's only nine thousandths of a second! Drive access is also measured by rotational speed. The faster a drive spins, the quicker it can get data positioned under the read-write head. Most of today's drives operate at 7,200 rpm.

Data stored on magnetic media can be unintentionally altered by magnetic fields, dust, mold, smoke particles, heat, and drive malfunctions. It is crucial, therefore, to make backup copies of important data stored on your computer's hard disk.

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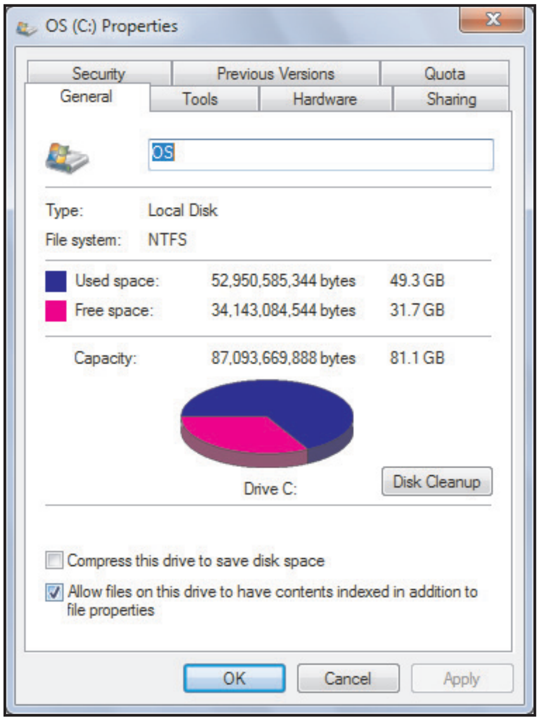
Hardware
(continued)

Hard disk drives have massive storage capacity, but they fill up fast. To find out how much space remains on your computer's hard disk, you can right-click a drive icon to display its Properties window, as shown in Figure 4-8.

Figure 4-8



OS

Type: Local Disk
File system: NTFS

🟦 Used space: 52,950,585,344 bytes 49.3 GB
🟪 Free space: 34,143,084,544 bytes 31.7 GB

Capacity: 87,093,669,888 bytes 81.1 GB

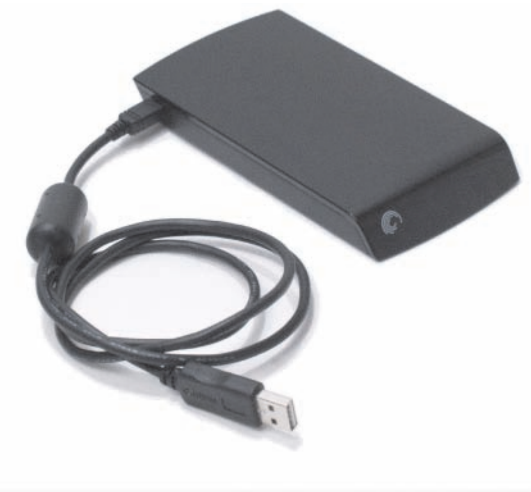
Drive C:

☐ Compress this drive to save disk space
☑ Allow files on this drive to have contents indexed in addition to file properties

If you run out of space on your original hard disk, for less than US$100 you can typically add a second hard disk drive inside the system unit of most desktop computer systems.

Another option is an **external hard disk drive**, such as the one in Figure 4-9. These drives typically connect to a USB port on your computer. They are the best option for portable computers, but can be used with desktop computers, too. External hard drives are available in capacities similar to internal hard drives, but they normally cost just a bit more.

Figure 4-9



An external hard disk drive can be used to transport large data files from computer to computer. They can also be used as backup devices. You simply back up or copy your data to the external hard disk drive, unplug the drive from your computer, and then store it in a safe location. If your computer is hit by lightning or otherwise damaged, the backup copy of your data should still be safe on the disconnected external hard disk drive.

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Hardware
(continued)

In the course of adding, modifying, and deleting files, the efficiency of your PC's hard disk drive begins to decrease so that it takes longer to store, find, and retrieve files. Why does this happen and what can you do about it?

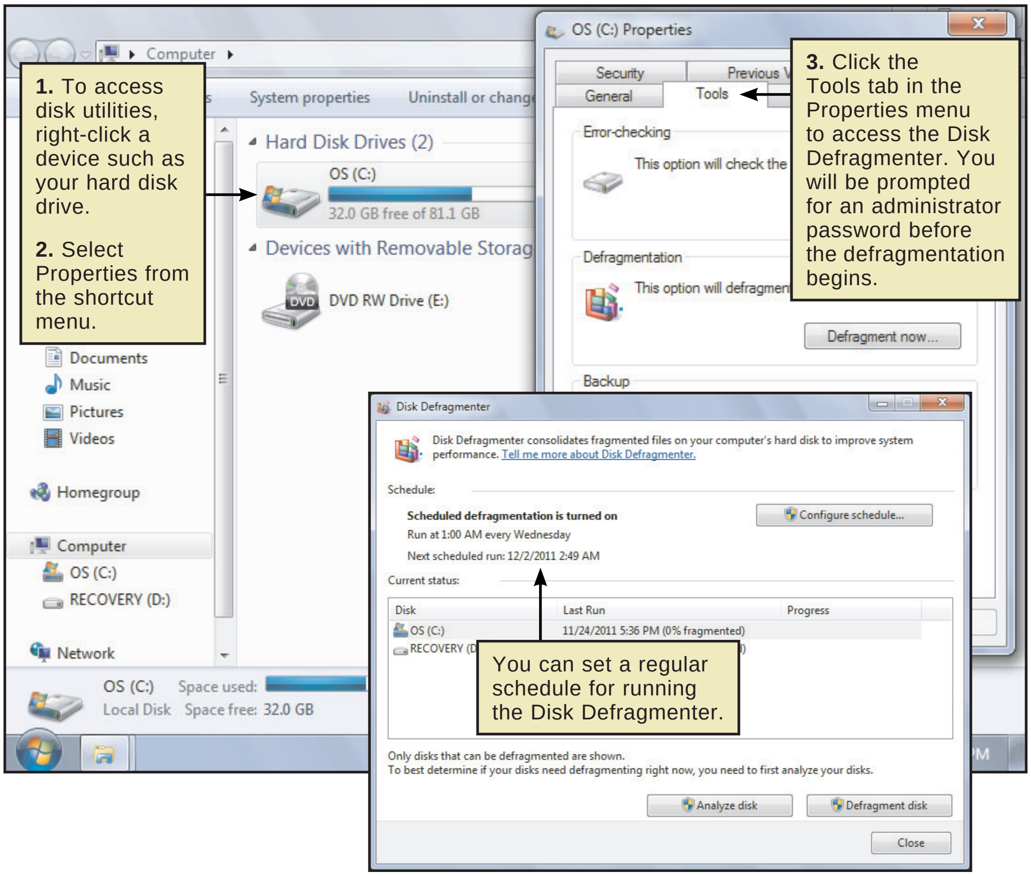
A hard disk is divided into concentric circles called **tracks**. Each track is divided into **sectors**. Each sector is a fixed size and can hold a certain amount of data. Although a file does not have to fill a sector, your PC must use more than one sector for a large file. For the most efficient hard disk operation, your PC should place the data for a large file in adjacent sectors so that the read-write head can quickly move from one part of the file to the next. Your files are not always stored so efficiently. In the course of revising your files, the sectors in which they are stored can become scattered all over the disk.

In "tech speak," a file that is stored in nonadjacent sectors is referred to as a **fragmented file**. A disk containing many fragmented files is called a **fragmented disk** and is not operating at peak efficiency. Windows provides a **defragmentation utility** that you can use periodically to put the data for each file in adjacent sectors. Defragmentation works behind the scenes so it does not affect the structure of files and folders that you've created. After defragmenting your disk, your computer should retrieve and store your files more quickly.

Most experts recommend that you defragment your hard disk at least two or three times a year. But you can set up automated defragmentation to take place weekly or monthly. To access defragmentation and other handy disk utilities, right-click your computer's hard disk icon. Click the Try It! button to see how to defragment a disk and find out how much space is available on your PC's hard disk.

Try It!

Figure 4-10


Computer
System properties
Uninstall or chang
Hard Disk Drives (2)
OS (C:)
32.0 GB free of 81.1 GB
Devices with Removable Storag
DVD
DVD RW Drive (E:)
Documents
Music
Pictures
Videos
Homegroup
Computer
OS (C:)
RECOVERY (D:)
Network
OS (C:) Space used:
Local Disk Space free: 32.0 GB
OS (C:) Properties
Security
Previous V
General
Tools
Error-checking
This option will check the
Defragmentation
This option will defragmen
Defragment now...
Backup
Disk Defragmenter
Tell me more about Disk Defragmenter.
Schedule:
Configure schedule...
Current status:
Analyze disk
Defragment disk
Close

1. To access disk utilities, right-click a device such as your hard disk drive.

2. Select Properties from the shortcut menu.

3. Click the Tools tab in the Properties menu to access the Disk Defragmenter. You will be prompted for an administrator password before the defragmentation begins.

Disk Defragmenter consolidates fragmented files on your computer's hard disk to improve system performance.

Scheduled defragmentation is turned on
Run at 1:00 AM every Wednesday
Next scheduled run: 12/2/2011 2:49 AM

Disk	Last Run	Progress
OS (C:)	11/24/2011 5:36 PM (0% fragmented)	
RECOVERY (D	)	

Only disks that can be defragmented are shown.
To best determine if your disks need defragmenting right now, you need to first analyze your disks.

You can set a regular schedule for running the Disk Defragmenter.

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Project

Open and save files

You can create files using several different techniques, but the process typically begins by opening the application that you'll use to enter your text, graphics, or sounds for the new file. In this chapter, you learned how to save the files you create. You also discovered various ways of opening files. You were introduced to the concept of file types, which are associated with applications called default programs.

When you have completed this project, you should be able to:

- Identify an application's usual file type.
- Create and save new files.
- Use different methods to open files from within an application.
- Open files from a jump list and the Windows desktop.

Requirements: This project requires Microsoft Windows 7, Notepad, WordPad, Paint, and three other applications of your choice. E-mail is optional for submitting deliverables.

Deliverables:

1 Notepad's default file type and file name extension

2 WordPad's default file type and file name extension

3 A list of WordPad's alternative file types

4 The default file types of three applications of your choice

5 A file or printout of Drawing Third Draft

1. Unless you specify otherwise, an application saves files as a standard file type, sometimes referred to as a native file format. You can often determine an application's standard file type by viewing the Save As dialog box that is displayed when you save a file. Use the Start menu's Search box to open the Notepad application. Click the File menu and select Save. Write down Notepad's standard file type shown in the *Save as type* box.

2. Write down the file name extension that is associated with Notepad's standard file type. Click the Cancel button, then close the Notepad program.

3. Using the Start menu's Search box, open the WordPad program, and write down its standard file type and file name extension.

4. List the alternative file formats that you can use with WordPad by clicking the down-arrow button of the *Save as type* box. Click the Cancel button, then close the WordPad program.

5. Open three other applications and list their standard file types.

6. Open the Paint program. A ribbon containing drawing tools should be at the top of the window. Click the Shapes button, and then select the rectangle. Toward the upper-left corner of the window, draw a rectangular box that's approximately 1 x 2 inches.

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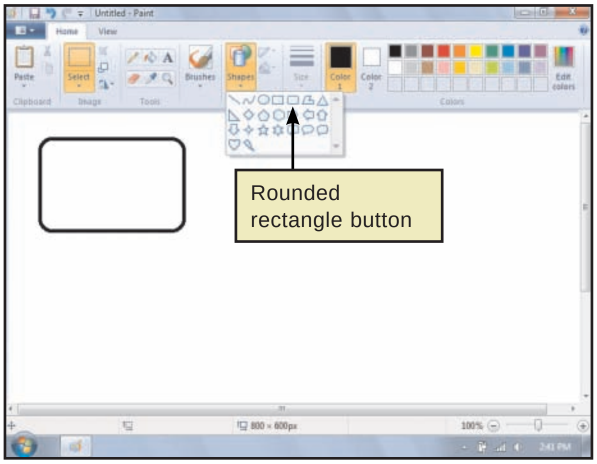
• Open and save files (continued)

7. As part of their user interfaces, most applications provide a way to undo any actions you've taken in case you make mistakes. In Paint, you can click the Undo button on the Quick Access toolbar at the top of the window. The Redo option repeats the action that you have just undone.

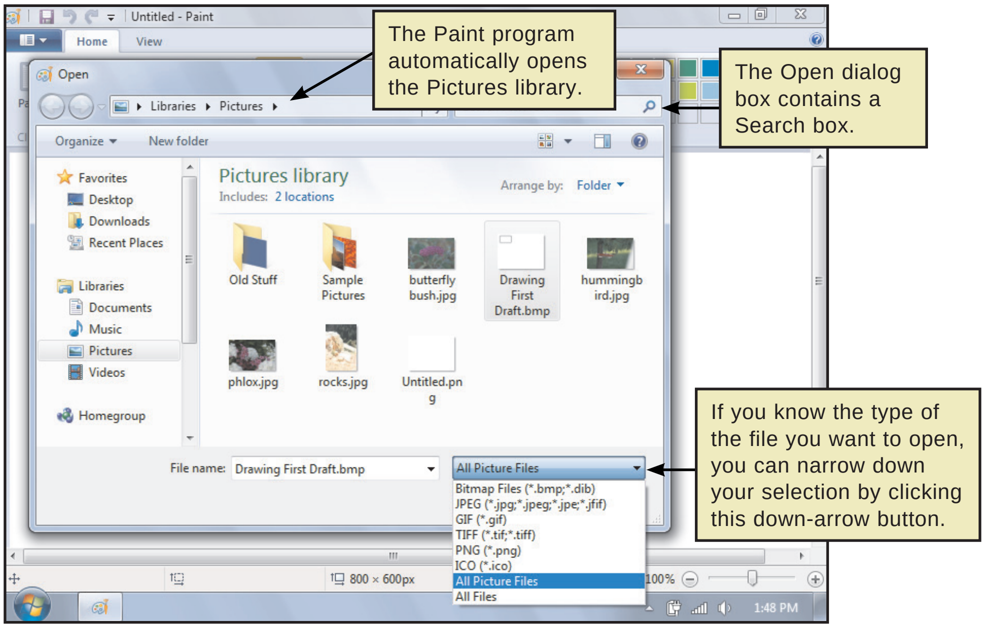
8. Suppose you decide that you want a rounded rectangle instead of a rectangle. Click the Undo button, select the Shapes button, and then click the rounded rectangle. Redraw the 1 x 2-inch box. Your drawing should look like the example here.


Rounded rectangle button

Untitled - Paint
Home
View
Paste
Select
Brushes
Shapes
Size
Color 1
Color 2
Edit colors
Clipboard
Image
Tools
Colors
800 × 600px
100%

9. Click the Paint button and select Save As. Type **Drawing First Draft** for the file name. Click the down-arrow button of the *Save as type* box and select 24-bit Bitmap (*.bmp;*.dib) from the list. The file should automatically be saved in your Pictures folder. Close the Paint program.

10. Suppose a few days have passed and you want to modify your drawing. Open the Paint program. Click the Paint button and select Open. Double-click the file named *Drawing First Draft*. Your rounded rectangular box should now be in the Paint window.


The Paint program automatically opens the Pictures library.

The Open dialog box contains a Search box.

If you know the type of the file you want to open, you can narrow down your selection by clicking this down-arrow button.

File name: Drawing First Draft.bmp

All Picture Files

Untitled - Paint
Home
View
Open
Libraries ▸ Pictures ▸
Organize ▾
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Pictures library
Includes: 2 locations
Arrange by: Folder ▾
Old Stuff
Sample Pictures
butterfly bush.jpg
Drawing First Draft.bmp
hummingbird.jpg
phlox.jpg
rocks.jpg
Untitled.png
Bitmap Files (*.bmp;*.dib)
JPEG (*.jpg;*.jpeg;*.jpe;*.jfif)
GIF (*.gif)
TIFF (*.tif;*.tiff)
PNG (*.png)
ICO (*.ico)
All Picture Files
All Files
800 × 600px
100%
1:48 PM

11. For this project, color the box red. Click the red box in the color palette at the top of the Paint window. Select the *Fill with color* button on the ribbon, then click anywhere within the rectangle. The rectangular box should turn red. Save the file as **Drawing Second Draft**. Close the Paint program.

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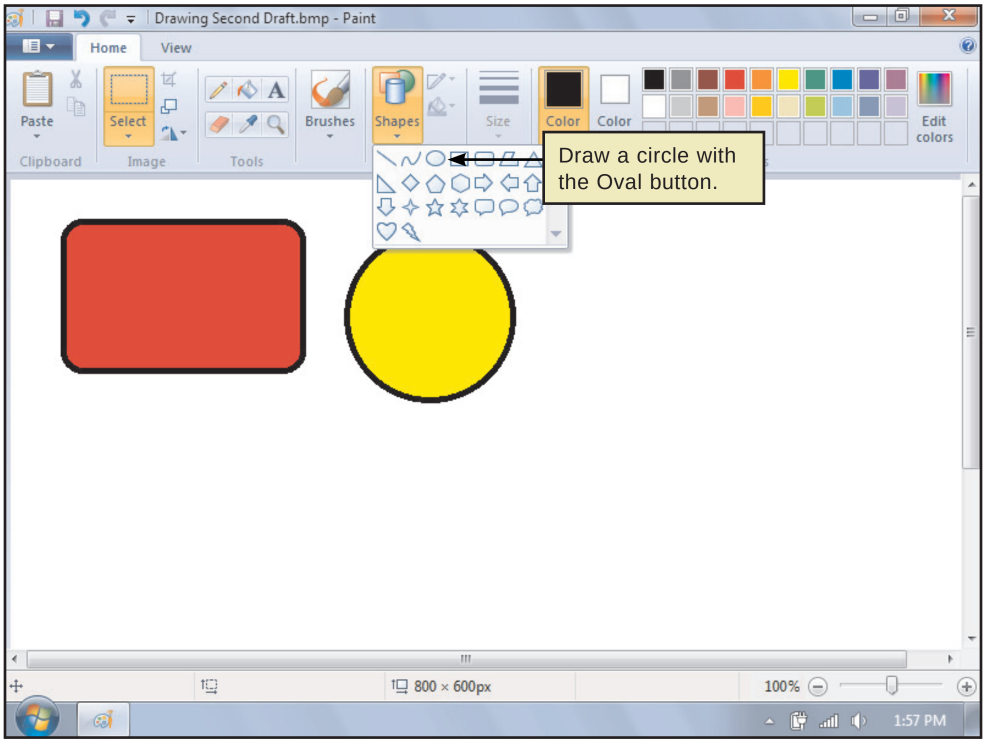
• Open and save files (continued)

12. Suppose you want to add another shape to your drawing. You can use the Search box of the Open dialog box to locate your file. Open Paint, click the Paint button, and select Open. Type **drawing** in the Search box. The search should return files with “drawing” in the file name. Double-click *Drawing Second Draft*. Click the Oval button from the Shapes group and draw a circle anywhere next to the rectangle. Color the circle yellow. Your drawing should look like the example below. Save the file as **Drawing Third Draft [Your Name]**. Close the Paint window.



Draw a circle with the Oval button.

13. In addition to opening files from within an application, you can also access your files from the Start menu’s Search box and from the Windows desktop. Open the Start menu and type **drawing** in the Search box. Your three drafts should appear in the list.

14. To create a desktop icon for your third and final draft, right-click *Drawing Third Draft*. Select Send To from the shortcut menu. Select *Desktop (create shortcut)* from the list of options. An icon for *Drawing Third Draft* should appear on your desktop.

15. Typically, you can double-click a desktop icon to modify your file with the same application that you used to create it. Suppose that you are not sure which application Windows will open as the default program. Right-click the icon for *Drawing Third Draft*. Select the *Open with* option and click Paint. Use Paint’s Paint button to print your screenshot.

16. Consolidate the deliverables for Project 4 into printed format, a document file, or an e-mail message as specified by your instructor.

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Issue

How permanent are electronic files?

Conventional wisdom might lead you to believe that files stored on computers must be far safer than their nonelectronic counterparts scattered in filing cabinets, ledgers, and laboratory notebooks. Surely, the data stored on computers must have a longer life expectancy than records stored on flimsy paper.

The unsettling answer is that electronic data has a relatively short lifespan. Several factors are to blame, including media deterioration and, surprisingly, advances in storage technologies.

Electronic storage media are able to hold data for a limited period of time before they begin to deteriorate, lose data, and become unreadable. Solid state and magnetic media have life expectancies of about ten years. Data stored on optical media, such as CDs and DVDs, might last for 30 years or more. Although that period of time seems ample for storing your old English Lit term papers, it is woefully inadequate for data gathered by private, public, and government agencies related to births, deaths, marriages, land ownership, military service, news, business transactions, and other data of historical interest.

In today’s computerized world, government and business data is typically archived onto a set of discs or computer tapes and stored in a safe, climate-controlled place. Periodically, that data might be moved to a fresh set of discs or tapes to offset gradual deterioration. New storage technologies with increasingly long life spans are being developed. For example, a DVD crafted from synthetic stone is supposed to hold data for 1,000 years!

As data sits in its archival vaults, however, computer equipment is constantly changing. Even if the data itself does not deteriorate, after a point, the devices necessary to access that data might no longer exist. And suppose you cleverly store the device with the data. You still might not be able to access the data if future operating systems no longer include the software necessary to interact with those old storage devices.

Various solutions to the archival storage problem exist, but they all require proactive planning and execution. Whereas the Dead Sea Scrolls could be read thousands of years after they were written, archeologists who come across a cache of USB flash drives a thousand years from now are unlikely to glean any useful information from them.

What do you think?

1. Do you have any electronic files that you would want to access 30 or 40 years from now?	○Yes ○ No ○ Not sure
2. Can you think of any business or government agency that might have a problem accessing archival data in the future?	○ Yes ○ No ○ Not sure
3. Do you think most people are aware of the potential problem related to accessing archival data?	○ Yes ○ No ○ Not sure

SaveIt!

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QuickCheck A

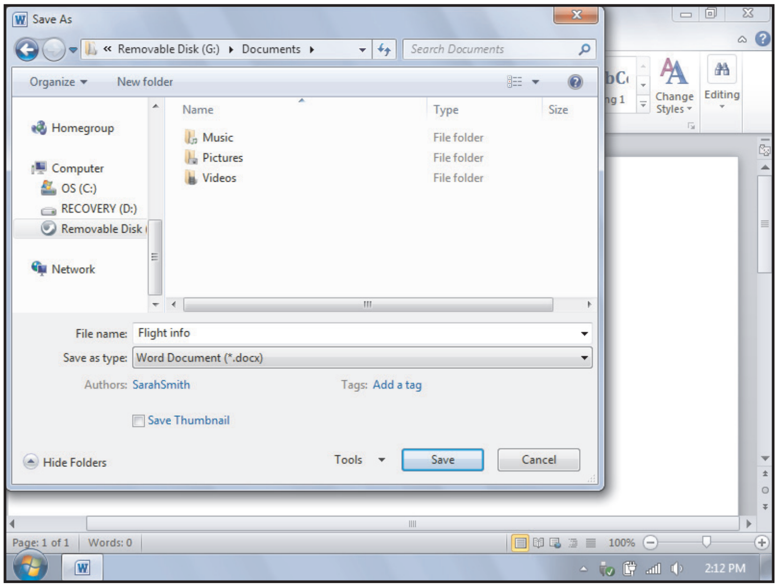
1. In the example Budget.xlsx, the file name extension is ______ .
2. True or false? Libraries are the same as folders. ______
3. Hard disk drives are an example of ______ storage technology.
4. If Windows opens the wrong application for a data file you've selected, you can change the ______ program to specify which application should automatically be opened.
5. True or false? You can open both programs and files from the Start menu's Search box. ______

CheckIt!

QuickCheck B

Based on the settings shown, fill in the boxes below to indicate where and how the file will be saved.

1. The file name will be ______ .
2. The device letter is ______ .
3. The author name is ______ .
4. The folder name is ______ .
5. The file type is a(n) ______ .


Save As
« Removable Disk (G:) ▸ Documents ▸
Search Documents
Organize ▾
New folder
Homegroup
Computer
OS (C:)
RECOVERY (D:)
Removable Disk
Network
Name
Type
Size
Save Thumbnail
Hide Folders
Tools ▾
Save
Cancel
Change Styles
Editing
Page: 1 of 1
Words: 0
100%
2:12 PM

Name	Type
Music	File folder
Pictures	File folder
Videos	File folder

File name: Flight info

Save as type: Word Document (*.docx)

Authors: SarahSmith

Tags: Add a tag

CheckIt!

GetIt? While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 4.

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CHAPTER 5

Organizing Files and Folders

What's Inside?

Chapter 5 provides tips on organizing files, folders, and libraries so that you can easily locate them. The Hardware section focuses on CD, DVD, and Blu-ray drives.

- **FAQs:**
  - How do I get a list of my files? 65
  - How do I navigate to different folders and storage devices? 66
  - Can I create my own libraries and folders? 67
  - How do I change the names of files and folders? 68
  - How do I move files and folders? 69
  - How do I copy files and folders? 70
  - What if I run out of disk space? 71
- **Hardware:** CDs, DVDs, and Blu-ray discs 72
- **Project:** Organize and find files 75
- **Issue:** Are deleted files legally garbage? 78
- **QuickChecks** 79

What's on the CD?

In Chapter 5, you'll take an in-depth look at how to use Windows Explorer. You'll also find out how to burn discs with data and your favorite music.

- Learn how to use Windows Explorer to find your files 66
- Explore Windows 7 libraries 67
- Discover how experts move files 69
- Learn how experts copy files 70
- Watch the Recycle Bin in action 71
- Discover how to burn CDs, DVDs, and Blu-ray discs 74

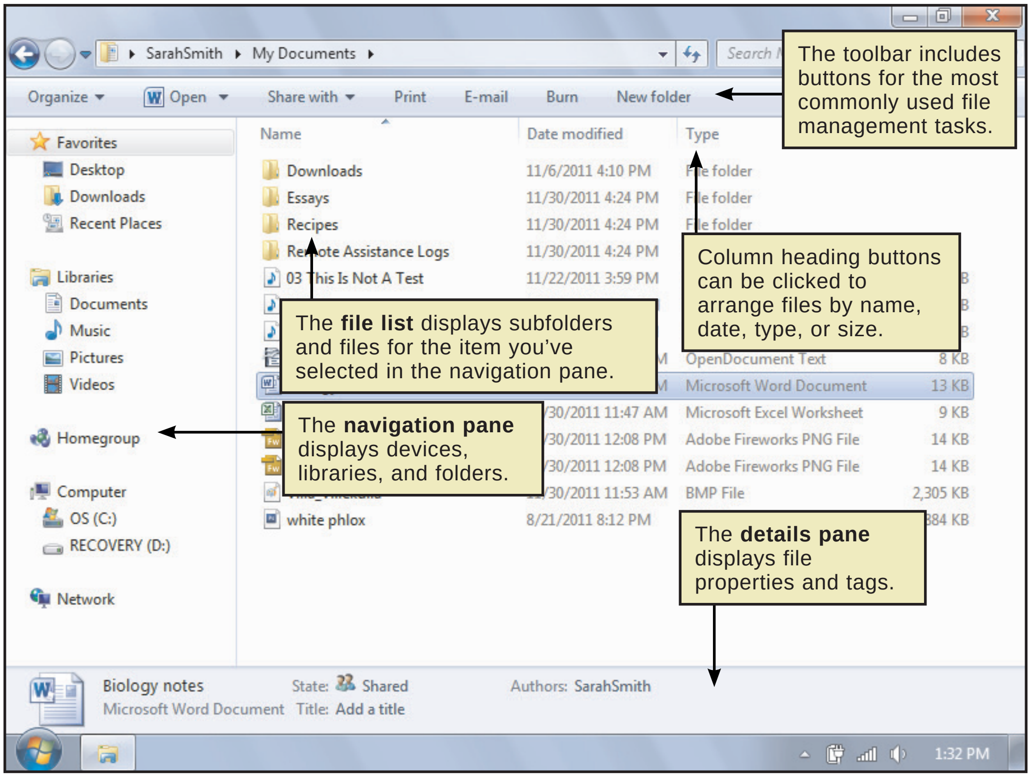
FAQ How do I get a list of my files?

You can get the big picture for the files stored on all the devices connected to your computer by accessing folders displayed by the operating system's file management module called **Windows Explorer**. The quickest way to open Windows Explorer is to click the Start button and then click Computer.

You can use Windows Explorer to change file or folder names, move files to different folders, move folders to different storage devices, delete individual files, or delete entire folders and the files they contain. You can also use Windows Explorer to organize your libraries.

Understanding elements of Windows Explorer helps you find files and keep them organized. Study Figure 5-1 to familiarize yourself with additional elements of the Windows Explorer window.

Figure 5-1


SarahSmith ▸ My Documents ▸
Search
Organize
Open
Share with
Print
E-mail
Burn
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
OS (C:)
RECOVERY (D:)
Network
Name
Date modified
Type
Downloads
Essays
Recipes
Remote Assistance Logs
03 This Is Not A Test
white phlox
Biology notes
Microsoft Word Document
State: Shared
Title: Add a title
Authors: SarahSmith
1:32 PM

The toolbar includes buttons for the most commonly used file management tasks.

Column heading buttons can be clicked to arrange files by name, date, type, or size.

The **file list** displays subfolders and files for the item you've selected in the navigation pane.

The **navigation pane** displays devices, libraries, and folders.

The **details pane** displays file properties and tags.

The navigation pane contains a variety of additional elements to help you quickly locate files.

Favorites give you fast access to folders you use frequently. Simply drag a folder or file to the Favorites list and you won't have to click through layers of folders to reach it.

Public folders provide a means of sharing files with other people who have accounts on your computer or who have access to your computer over a network. You can control access to these folders by right-clicking them and selecting *Advanced sharing settings*. Files that you want to share with others can be stored in public folders. Files that you do not want to share should not be stored there.

Homegroup offers access to folders, files, and printers on computers in a home network. When your computer joins a homegroup, the computers for other members of the group are listed under the Homegroup option.

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FAQ How do I navigate to different folders and storage devices?

The organization of libraries, folders, and files shown in Windows Explorer is similar to the hierarchy of an organizational chart. The president or CEO is at the top of an organizational chart. On your computer, think of your hard disk as being the top of the hierarchy. Your folders are equivalent to various departments, and your files are equivalent to the employees in each department. The libraries on your computer are similar to committees; just as a committee can have members from various departments, libraries can have files from various folders.

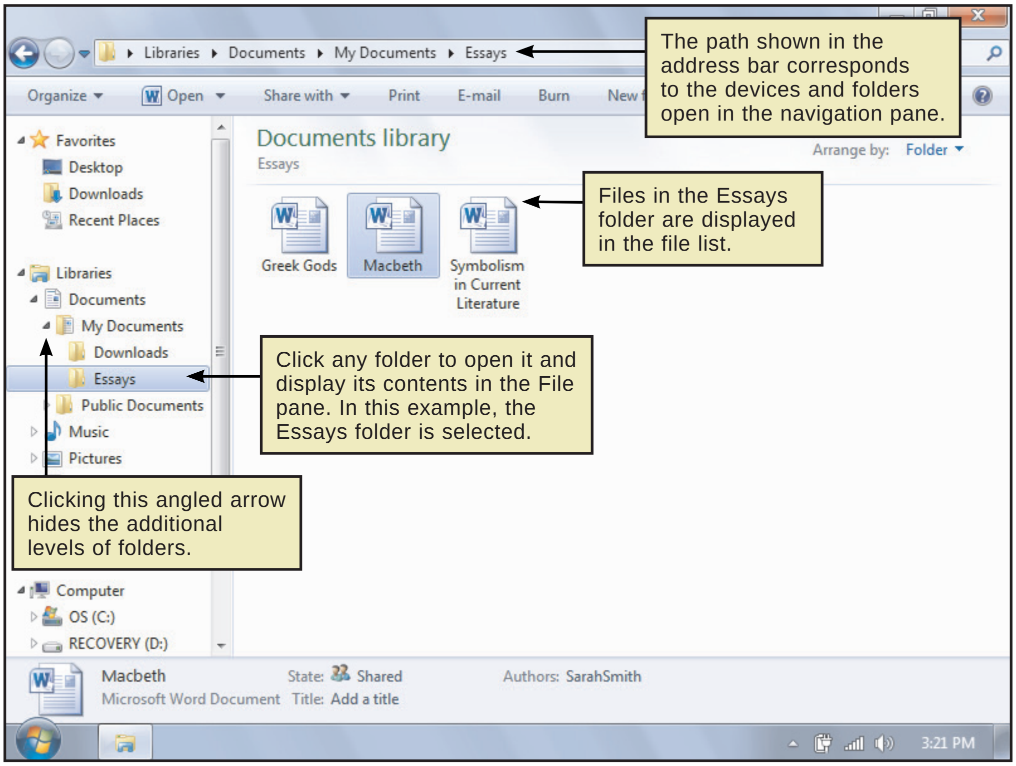
An organizational chart depicts the chain of command in a business. Similarly, the address bar at the top of the Explorer window depicts a **file path** that shows a file's position in the hierarchy. A file path consists of a device letter, folder, subfolder, file name, and extension. Depending on your Windows settings, the device letter might not be displayed. In the address bar, folders are separated by a ▸. When subfolders are written out in a file path, they are separated from folders with a \ backslash symbol. If you create a subfolder called "Essays" in the My Documents folder and use it to store a file called "Macbeth," its path would be written C:\My Documents\Essays\Macbeth.docx.

Although you can click any part of the address bar to track up the hierarchy, the navigation pane offers a more effective way to thread your way to a particular folder or file. When working in the navigation pane, double-clicking a folder or clicking the small arrow next to it displays additional levels of folders. To hide levels of folders, click the angled arrow.

Single-clicking a library or folder displays the files it contains, but you have to look in the file list on the right side of the window to see them. Click the Try It! button to learn how to navigate the Explorer window.

Try It!

Figure 5-2



Libraries ▸ Documents ▸ My Documents ▸ Essays
Organize
Open
Share with
Print
E-mail
Burn
New
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
My Documents
Downloads
Essays
Public Documents
Music
Pictures
Computer
OS (C:)
RECOVERY (D:)
Documents library
Essays
Arrange by: Folder
Greek Gods
Macbeth
Symbolism in Current Literature
Macbeth
Microsoft Word Document
State: Shared
Title: Add a title
Authors: SarahSmith
3:21 PM

The path shown in the address bar corresponds to the devices and folders open in the navigation pane.

Files in the Essays folder are displayed in the file list.

Click any folder to open it and display its contents in the File pane. In this example, the Essays folder is selected.

Clicking this angled arrow hides the additional levels of folders.

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FAQ Can I create my own libraries and folders?

Windows 7 provides each user account with a set of folders and libraries. To maintain well organized storage, you will certainly want to create additional folders. You might also decide to create additional libraries.

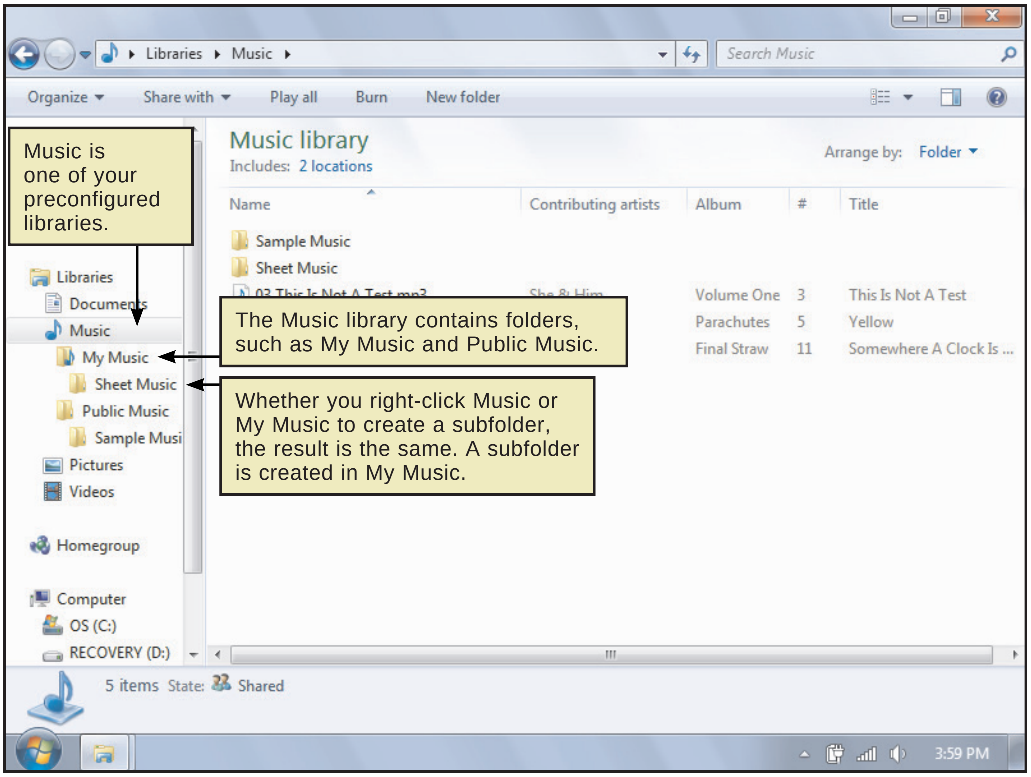
Let's consider folders first. If you store all your documents in the My Documents folder, eventually, it will contain so many files that you might have difficulty finding the files you want. Creating subfolders is the answer. To do so, simply right-click a folder, select New, and then select Folder. Enter a name for the subfolder. Once the subfolder is created, you can move files into it.

Next, consider libraries. A library is similar to a folder in the sense that it can be used to group similar files. A library, however, doesn't actually store files. Instead, it contains a set of pointers to files that are stored on various devices and in various folders. To understand how you might use libraries, think about a collection of music files. Some files might be stored on your hard disk in the My Music folder. Other music might be stored on an external hard drive in a folder called "Jazz." Your Music library can contain listings for the music files in both folders so that you can access them all from one listing.

The concept to understand is that a library such as Music is not a "real" location; it is more like an index in a book. If you try to create a subfolder by right-clicking the Music library, the subfolder will actually be created under My Music, which is a "real" folder. Figure 5-3 explains this concept further. Click the Try It! button to learn more about creating and using folders, subfolders, and libraries.

TryIt!

Figure 5-3



Music is one of your preconfigured libraries.

The Music library contains folders, such as My Music and Public Music.

Whether you right-click Music or My Music to create a subfolder, the result is the same. A subfolder is created in My Music.

Libraries ▸ Music ▸
Search Music
Organize ▾
Share with ▾
Play all
Burn
New folder
Music library
Includes: 2 locations
Arrange by: Folder ▾
Name
Contributing artists
Album
#
Title
Sample Music
Sheet Music
03 This Is Not A Test.mp3
She & Him
Volume One
3
This Is Not A Test
Parachutes
5
Yellow
Final Straw
11
Somewhere A Clock Is ...
Libraries
Documents
Music
My Music
Sheet Music
Public Music
Sample Music
Pictures
Videos
Homegroup
Computer
OS (C:)
RECOVERY (D:)
5 items State: Shared
3:59 PM

FAQ How do I change the names of files and folders?

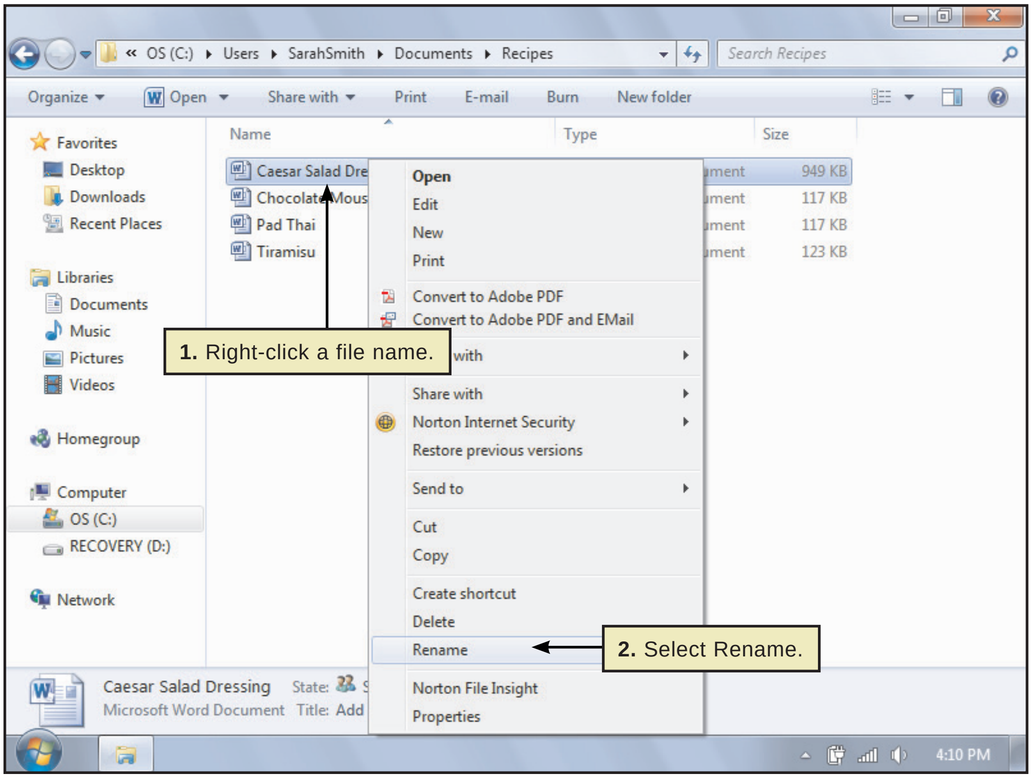
Once you have located a file or folder, it's easy to **rename** it so that its name better describes its contents. You can also use the Rename command to standardize the names of similar files, such as Playoff 2009, Playoff 2011, and Playoff 2012, so that they appear in sequence.

Renaming files is fairly straightforward, except for a little twist involving file extensions. When file extensions are hidden, it is not necessary to worry about them. As you rename a file, Windows automatically retains the old file extension for the new file name.

When file extensions are visible, however, you should be careful not to change them. Windows uses a file's extension to determine the application that opens it. If the extension is changed, Windows might not be able to open it. For example, if you were to inadvertently change a document's extension from .docx to .bmp, Windows would no longer try to open it with Microsoft Word. Instead it would try to open it with Paint, and that would produce an error because the file does not contain a graphic.

One method for renaming a file is right-clicking the file name, then selecting Rename from the shortcut menu. You can also initiate a name change by clicking the file name, then clicking it again. After a brief pause, you'll be able to type the new name. Renaming a folder follows the same general procedures as renaming a file. Figure 5-4 illustrates the right-click procedure for renaming a file.

Figure 5-4


« OS (C:) ▸ Users ▸ SarahSmith ▸ Documents ▸ Recipes
Search Recipes
Organize
Open
Share with
Print
E-mail
Burn
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
OS (C:)
RECOVERY (D:)
Network
Name
Type
Size
Caesar Salad Dre
Chocolate Mous
Pad Thai
Tiramisu
949 KB
117 KB
117 KB
123 KB
Open
Edit
New
Print
Convert to Adobe PDF
Convert to Adobe PDF and EMail
with
Share with
Norton Internet Security
Restore previous versions
Send to
Cut
Copy
Create shortcut
Delete
Rename
Norton File Insight
Properties
Caesar Salad Dressing
Microsoft Word Document
State:
Title: Add
4:10 PM

1. Right-click a file name.

2. Select Rename.

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FAQ How do I move files and folders?

The key to organizing your files is a clearly structured set of folders. The personal folders that Windows preconfigures for you are a good starting point. However, if the number of files in these folders exceeds what you find to be manageable, don't hesitate to create subfolders and move files into them.

Here are a few hints to help you improve the organization of your files:

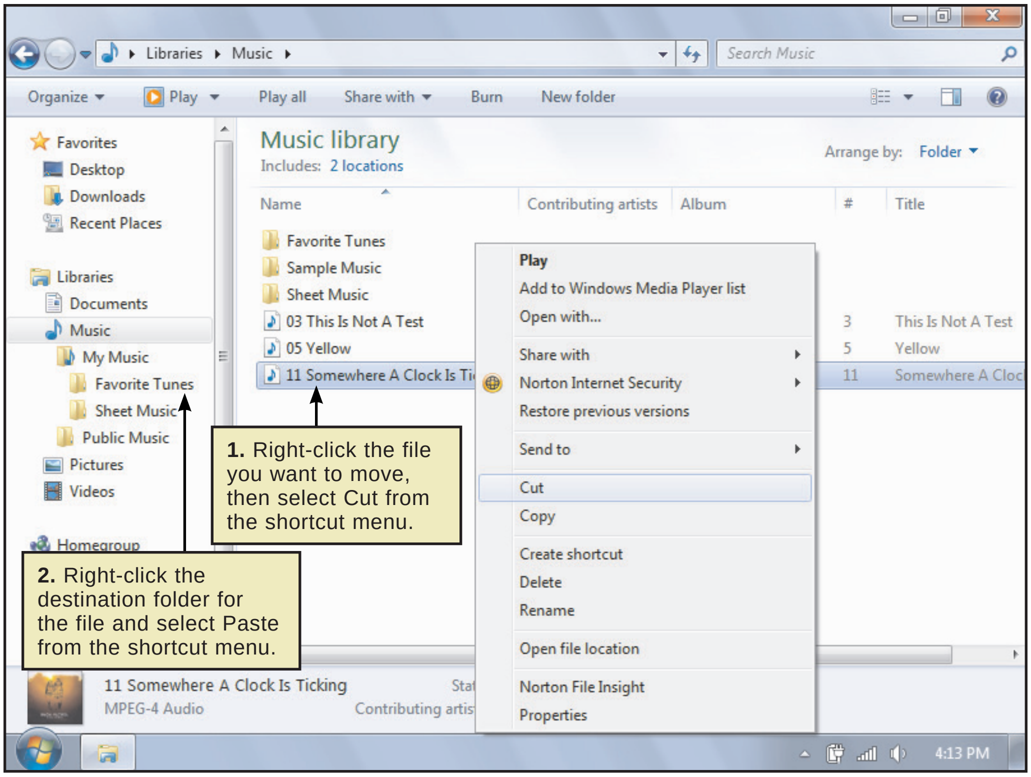
- Always store your data files in a folder; do not try to store files directly in the root directory of your hard disk, designated OS (C:).
- Store your personal files in the predefined folders for your account, such as My Documents, My Pictures, and My Music.
- Store files that you want to share with others in public folders.
- Create subfolders to group files by project or by type. Use descriptive names for the folders you create.
- Try not to store your data files in folders that contain program modules for your application software.

When you move a file or folder, Windows removes or "cuts" it from its current location and places it on the **Windows Clipboard**—a temporary holding area in your PC's memory. After you select a new location, Windows "pastes" the selected file or folder from the Clipboard to that location. Associating the process of moving files and folders with "cut and paste" will help you remember the sequence of commands.

Windows offers more than one way to move files and folders. Cut and paste is one of the easiest and safest methods. Click the Try It! button in Figure 5-5 to learn more about moving files and folders.

Try It!

Figure 5-5


Libraries ▸ Music ▸
Search Music
Organize
Play
Play all
Share with
Burn
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
My Music
Favorite Tunes
Sheet Music
Public Music
Pictures
Videos
Homegroup
Music library
Includes: 2 locations
Arrange by: Folder
Name
Contributing artists
Album
#
Title
Favorite Tunes
Sample Music
Sheet Music
03 This Is Not A Test
05 Yellow
11 Somewhere A Clock Is Ti
3
This Is Not A Test
5
Yellow
11
Somewhere A Cloc
Play
Add to Windows Media Player list
Open with...
Share with
Norton Internet Security
Restore previous versions
Send to
Cut
Copy
Create shortcut
Delete
Rename
Open file location
Norton File Insight
Properties
11 Somewhere A Clock Is Ticking
MPEG-4 Audio
Contributing artis
4:13 PM

1. Right-click the file you want to move, then select Cut from the shortcut menu.

2. Right-click the destination folder for the file and select Paste from the shortcut menu.

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FAQ How do I copy files and folders?

Typically, you copy a file when you want to create a duplicate. You could copy a file onto a USB flash drive to transport it to a school computer lab, home, or work. You might copy a group of important files to a CD, which you could store in a secure location. To copy a file, Windows places a duplicate of the file on the Clipboard. The original file remains in its present location. After you select a location for the copy, your PC pastes the file from the Clipboard to the new location. Think of copying files as “copy and paste” to help remember this sequence of commands.

To copy a single folder or file, right-click it, then select Copy from the shortcut menu. Right-click the destination for the file or folder and click Paste.

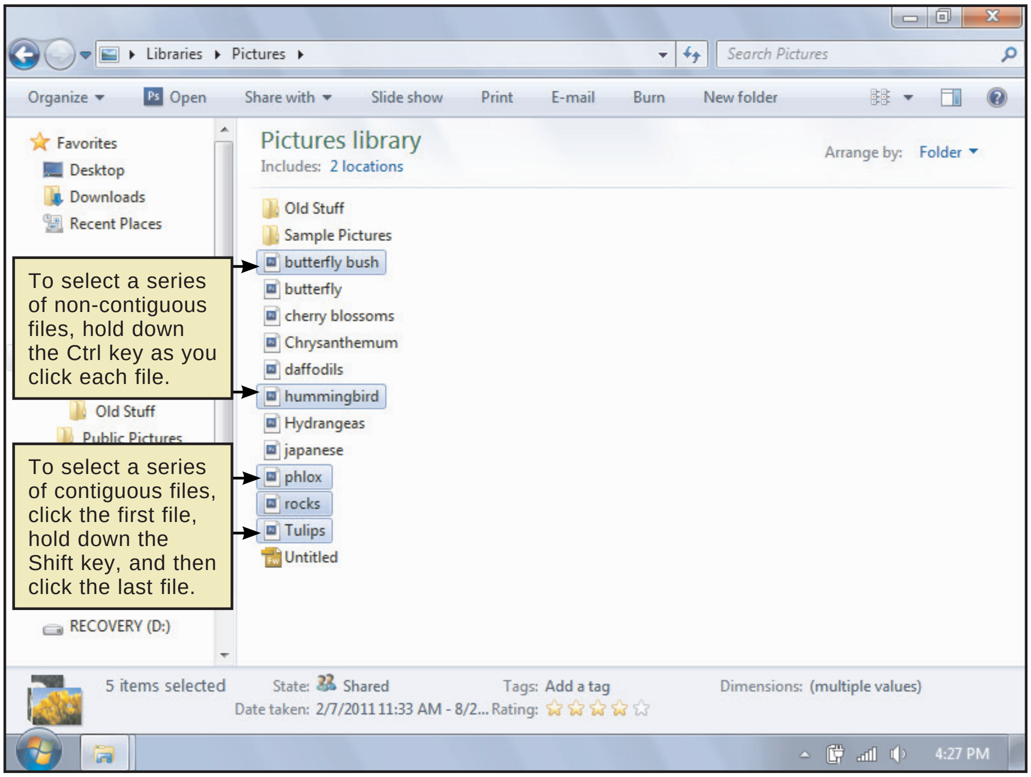
In addition to copying a single file, you can copy groups of files. To select a series of files, click the first file and then hold down the Shift key as you click the last file. All of the files in between will be selected. Continue holding down the Shift key as you right-click to view the shortcut menu.

If you want to select files that aren’t listed contiguously, hold down the Ctrl key while you select each file.

Click the Try It! button to learn how to select files using the Shift and Ctrl keys.

Try It!

Figure 5-6


Libraries
Pictures
Search Pictures
Organize
Open
Share with
Slide show
Print
E-mail
Burn
New folder
Favorites
Desktop
Downloads
Recent Places
Old Stuff
Public Pictures
RECOVERY (D:)
Pictures library
Includes: 2 locations
Arrange by: Folder
Old Stuff
Sample Pictures
butterfly bush
butterfly
cherry blossoms
Chrysanthemum
daffodils
hummingbird
Hydrangeas
japanese
phlox
rocks
Tulips
Untitled
5 items selected
State: Shared
Tags: Add a tag
Dimensions: (multiple values)
Date taken: 2/7/2011 11:33 AM - 8/2...
Rating:
4:27 PM

To select a series of non-contiguous files, hold down the Ctrl key as you click each file.

To select a series of contiguous files, click the first file, hold down the Shift key, and then click the last file.

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FAQ What if I run out of disk space?

If you run out of disk space, Windows displays a "Disk Full" message. This message usually means that it's time for some PC housecleaning. If your hard disk gets full, start by emptying your PC's Recycle Bin.

The **Recycle Bin** is a holding area for the files you've deleted from your PC's hard disk. When you delete a file from the hard disk, its name is removed from the file list, but the file itself remains on the disk and continues to occupy disk space. This space is not released until you empty the Recycle Bin. It is nice to know that a deleted file is not gone forever until you empty the Recycle Bin, but you should remember that it holds only hard disk files. The Recycle Bin doesn't keep files that you've deleted from removable media such as USB flash drives and CDs.

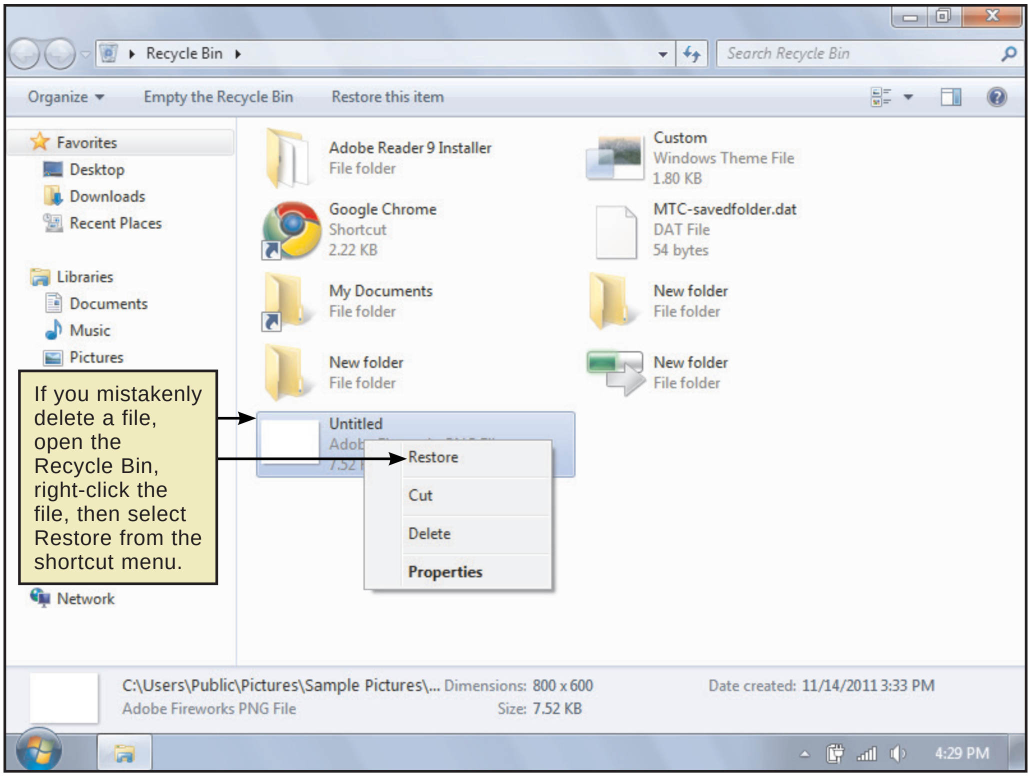
If emptying the Recycle Bin does not free up enough hard disk space for you to continue working, your next step would be to uninstall software that you no longer use. Deleting a single software application might provide room for hundreds of data files. When you uninstall software, remember to use the Control Panel's *Uninstall a program* option—don't simply delete the program file from the Folders list.

You should delete data files not so much because you've run out of disk space, but because you no longer need the files. You can easily delete a file by right-clicking it, and then selecting the Delete option. If you discover that you should not have deleted the file, you can recover it by opening the Recycle Bin icon on the desktop and right-clicking the file that you want to restore.

Click the Try It! button to find out how to delete a file and how to use the Recycle Bin.

Try It!

Figure 5-7


Recycle Bin
Search Recycle Bin
Organize
Empty the Recycle Bin
Restore this item
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Network
Adobe Reader 9 Installer
File folder
Custom
Windows Theme File
1.80 KB
Google Chrome
Shortcut
2.22 KB
MTC-savedfolder.dat
DAT File
54 bytes
My Documents
File folder
New folder
File folder
New folder
File folder
New folder
File folder
Untitled
Restore
Cut
Delete
Properties
C:\Users\Public\Pictures\Sample Pictures\... Dimensions: 800 x 600
Adobe Fireworks PNG File
Size: 7.52 KB
Date created: 11/14/2011 3:33 PM
4:29 PM

If you mistakenly delete a file, open the Recycle Bin, right-click the file, then select Restore from the shortcut menu.

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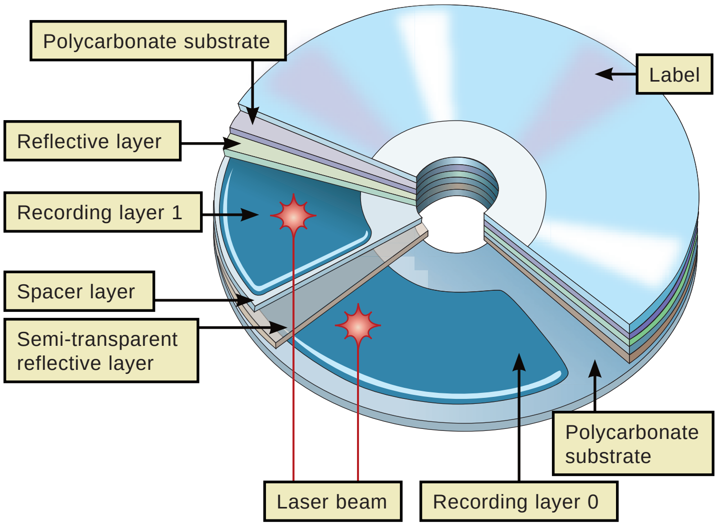
Hardware

CDs, DVDs, and Blu-ray discs

Those silver discs that you nonchalantly slide into your boom box, home theater system, or computer are based on **optical storage technology**, which records data as microscopic light and dark spots on a layer beneath the surface of a specially coated disc. The dark spots are called **pits**. The lighter, nonpitted surface areas of the disc are called **lands**. An optical drive rotates the disc over a laser lens. The laser directs a beam of light toward the underside of the disc to read the differences in reflected light from the dark pits and light lands (Figure 5-8).

Figure 5-8



Optical discs are quite durable and less susceptible to environmental damage than hard disks and other magnetic media because optical data is stored under a clear, protective surface. An optical disc is not affected by humidity, fingerprints, dust, magnets, or spilled soft drinks. Scratches on the disc surface can cause skips, however, as the laser attempts to read the data. A good buffing with toothpaste can sometimes erase the scratch without damaging the underlying data. An optical disc's life span is estimated to be at least 30 years.

Optical media include CDs, DVDs, and Blu-ray discs. The term **CD** first referred to audio compact discs that contained music albums. Computer CDs were originally called CD-ROMs to distinguish them from audio CDs. The term **CD-ROM** is an abbreviation of “compact disc read-only memory,” a reference to the fact that CD-ROMs are preloaded with data that can be “read” by your computer, but cannot be used to store additional data.

Computer CD drives can, however, store data on CD-R and CD-RW discs. **CD-R** (CD-recordable) technology allows you to create your own music CDs and data discs. Data on a CD-R cannot be changed once it is recorded.

A variation of CD technology, **CD-RW** (CD-rewritable), allows you to write data to CD-RW discs, and later change the data that they contain. Blank CD-RWs are a bit more expensive than CD-Rs and the recording process takes longer. Some computers have trouble reading CD-RWs created on other machines, so CD-Rs are considered more dependable than CD-RWs. A typical CD-R or CD-RW holds 650–700 MB of data.

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Hardware
(continued)

DVD (digital video disc) is a storage and distribution media originally designed to replace VHS videotape. A basic DVD has more than enough storage capacity for an entire feature-length film; up to 3 hours of high-resolution video or 8 hours of CD-quality audio. DVDs can also store computer data. Although it is the same physical size as a CD, a DVD can hold far more data. Data can be stored on a DVD using one of four formats, as shown in Figure 5-9. DVD storage capacity depends on whether data is stored on one or two sides of the disc, and how many layers of data each side contains.

Figure 5-9

Number of Sides	Number of Layers	Storage Capacity
1	1	4.7 GB
1	2	8.5 GB
2	1	9.4 GB
2	2	17.0 GB

As with CDs, DVDs are available in read-only, recordable, and rewritable formats. The read-only format used for distributing movies and videos is called DVD-ROM. DVD-R and DVD+R are recordable technologies that allow you to record data, but not change it. DVD-RW and DVD+RW are rewritable technologies that allow you to write data and later change it.

A **Blu-ray disc** (sometimes referred to as a BD) offers high-capacity storage for high-definition video and computer data. BD capacity offers 25 GB per layer. A single-layer BD can store about 4.5 hours of high-definition video or 11 hours of standard video.

Devices that play CDs, DVDs, and Blu-ray discs are commonly referred to as “players.” If the devices can also record data on discs, they are referred to as “burners.” The speed of an optical drive is denoted by X values, but the X-value scale differs for CD, DVD, and Blu-ray drives. The table in Figure 5-10 helps you compare the speed designations for optical drives.

Figure 5-10

Speed Specification	Data Transfer Rate (per second)		
	CDs	DVDs	Blu-ray
Single-speed	150 KB	1350 KB	4500 KB
2X	300 KB	2700 KB	9000 KB
4X	600 KB	5400 KB	18000 KB
8X	1200 KB	1030 KB	36000 KB
16X	2400 KB	2160 KB	72000 KB
24X	3600 KB	3240 KB	
32X	4800 KB		
48X	7200 KB		
56X	8400 KB		

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Hardware

(continued)

Many optical drives, sometimes referred to as **combination drives**, work with more than one type of media. For example, a DVD+R/RW/CD-R/RW drive can read DVD-ROMs, record DVD+Rs and DVD+RWs, read CD-ROMs, and record CD-Rs and CD-RWs. The price of a combination drive typically increases with the number of formats it can handle and its data transfer speed.

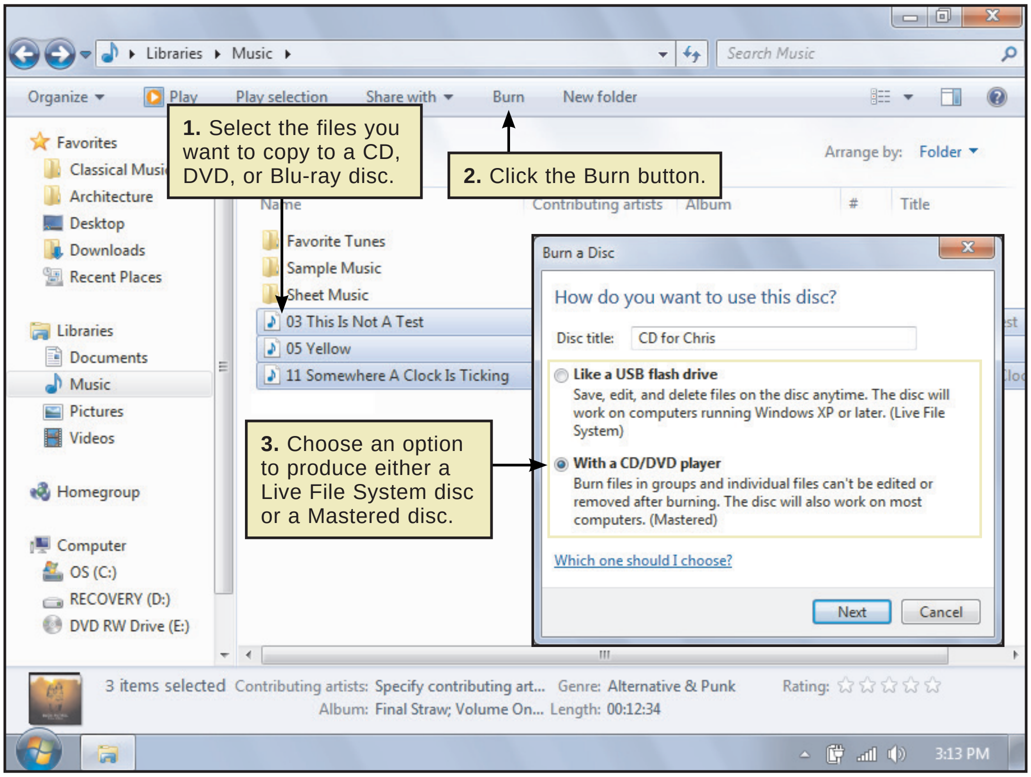
Most new PCs include a combination drive. You should pay attention to the specifications for your combination drive because they dictate the media you should purchase. For example, if your drive specifies DVD+R/RW, you should purchase DVD+R or DVD+RW discs, but not DVD-R or DVD-RW discs.

Windows 7 makes it easy to burn a CD, DVD, or Blu-ray disc. Simply select the files you want to copy. You can decide whether you want to burn the disc with Live File System or with a mastered image. **Live File System**, which is sometimes described as working like a USB flash drive, creates discs that can be changed at any time. You can leave one of these discs in your optical burner and store files on it whenever you want. These discs reliably work in computers running Windows 7, Vista, or XP, but do not work in standalone players.

Mastered discs, designated as the CD/DVD player option, can only be recorded in a single session, after which they are closed so that files cannot be added or changed. These discs work in standalone CD, DVD, and Blu-ray players. Click the Try It! button in Figure 5-11 to learn more about your options for burning CDs, DVDs, and Blu-ray discs.

TryIt!

Figure 5-11


Libraries ▸ Music ▸
Search Music
Organize ▾
Play
Play selection
Share with ▾
Burn
New folder
Favorites
Classical Music
Architecture
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
OS (C:)
RECOVERY (D:)
DVD RW Drive (E:)
Arrange by: Folder ▾
Name
Contributing artists
Album
#
Title
Favorite Tunes
Sample Music
Sheet Music
03 This Is Not A Test
05 Yellow
11 Somewhere A Clock Is Ticking
3 items selected Contributing artists: Specify contributing art... Genre: Alternative & Punk
Rating: ☆☆☆☆☆
Album: Final Straw; Volume On... Length: 00:12:34
3:13 PM

1. Select the files you want to copy to a CD, DVD, or Blu-ray disc.

2. Click the Burn button.

3. Choose an option to produce either a Live File System disc or a Mastered disc.

Burn a Disc

How do you want to use this disc?

Disc title: CD for Chris

○ **Like a USB flash drive**
Save, edit, and delete files on the disc anytime. The disc will work on computers running Windows XP or later. (Live File System)

● **With a CD/DVD player**
Burn files in groups and individual files can't be edited or removed after burning. The disc will also work on most computers. (Mastered)

Which one should I choose?

Next Cancel

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Project

Organize and find files

In addition to your PC's performance, how you manage and organize your files is an important factor in how quickly you can accomplish tasks with your computer. This chapter covered a wide range of file management topics, such as creating folders; renaming, moving, copying, and deleting files; and various shortcuts to finding your files.

When you have completed the project, you should be able to:

- Check your hard disk's space information.
- Identify all your personal folders.
- Create new folders and change folder views.
- Search for files using the Windows Explorer Search box.
- Sort files in the Recycle Bin.

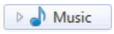
Requirements: This project requires Microsoft Windows 7 and Paint. A word processor or e-mail are optional for submitting deliverables.

Deliverables:

1. List of the categories and libraries displayed by Windows Explorer
2. List of items in the file list from the Computer folder
3. The storage capacity of your hard disk, the current used space, and the free space
4. List of the names of folders in the Music library
5. List of personal folders
6. Summary of what you learned about libraries and folders
7. A screenshot of the navigation pane hierarchy
8. A screenshot of a JPEG file's Properties window
9. The names and sizes of the largest file and folder in the Recycle Bin

1. The set of folders displayed by Windows Explorer depends on the method you use to launch it. Let's look at two convenient starting points: Computer and User. In the first half of this project, you'll work from the Computer folder. First, use the Start menu to select the Computer option. This option is convenient for getting the big picture of all the devices connected to your computer and for working with libraries. Make a list of the main categories displayed in the navigation pane. Make a list of the names of your libraries. Then list the items displayed in the file list.

2. You can use the Start menu's Computer option to access information about your hard disk. Right-click the icon for your hard disk and select Properties. Write down your hard disk's storage capacity, the used space, and the free space. Close the Properties window.

3. While the Computer window is open, let's take a look at your libraries. Click the small triangle icon next to the Music library . Look at the folders listed under the Music library and notice that your personal folder, My Music, is there. List the names of any other folders in the Music library.

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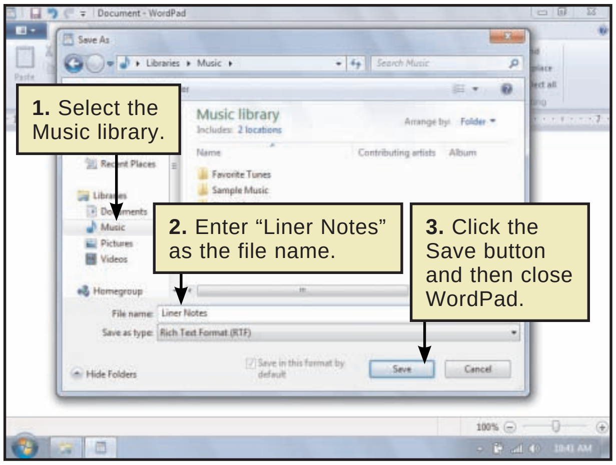
• Organize and find files (continued)

4. What happens when you save a file to the Music library? Open WordPad and type **Liner Notes** as the document title. Write a short description of your favorite music album. Click the WordPad button, select Save, and follow the instructions at right.



File name: Liner Notes

Save as type: Rich Text Format (RTF)

1. Select the Music library.

2. Enter "Liner Notes" as the file name.

3. Click the Save button and then close WordPad.

5. Now, back at the Computer folder, make sure the Music library is selected. Look at the file listing. Is Liner Notes there? Open the My Music folder. Is Liner Notes there? Although you saved your document in the Music library, it was actually saved in the My Music folder. Remember that a library just points to files in other folders. Close the Computer folder window. Summarize what you learned about saving files in libraries.

6. Now, let's see what your user folder looks like. Open the Start menu and click your user name. As you can see, this option is convenient when you want to quickly access your personal folders. Make a list of your personal folders.

7. Suppose you want to create a subfolder within the My Music folder. Double-click the My Music folder to open it. To create a new folder, click the New folder button on the toolbar and then enter **Classical Music** as the folder name.

8. You can also create a new folder when you save a file. Open the Paint program. Select a color and then select the *Fill with color* button. Click the work area to fill it in with the color you've selected. Now, click the Paint button and select Save. If the subfolders list does not appear, click the Browse Folders down-arrow button on the lower-left corner of the dialog box. Check the address bar to determine which folder or library is the default destination for the file. If this destination is not the Pictures library, locate Pictures in the navigation pane and click it.

9. Once the subfolders list is displayed, click the New Folder button under the address bar, then enter **Architecture** as the folder name. Double-click the Architecture folder to open it. Enter the file name **Background**, change the file type to JPEG, then click the Save button. Your file should now be in the Architecture folder. Close Paint. The Windows Explorer window should still be open.

10. Now imagine that you eventually accumulate lots of files in the Architecture folder and in the Classical Music folder. Rather than navigating through folders and subfolders, you can add these folders to your Favorites list for easy access. Find the Architecture folder and drag it to the Favorites heading. Next, find the Classical Music folder and drag it to the Favorites heading. Click each of the folders under Favorites to see how easy it is to access the files they contain.

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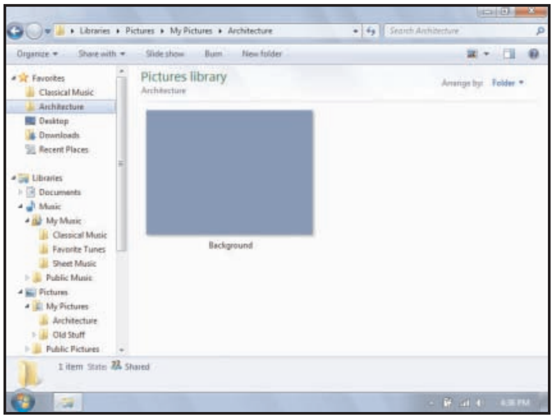
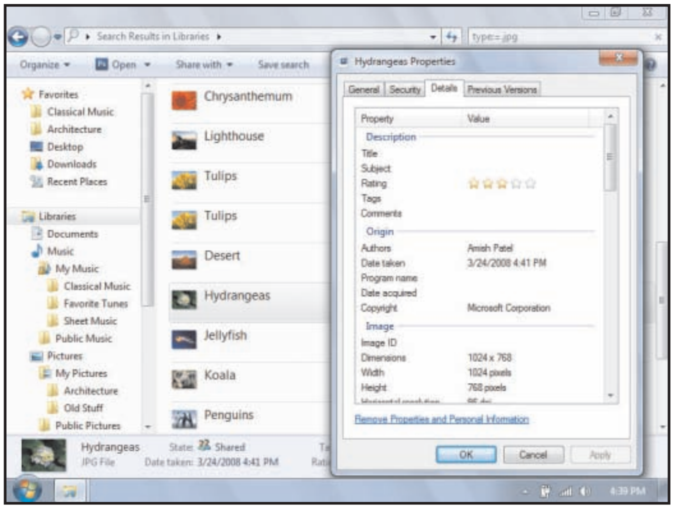
• Organize and find files (continued)

11. You can change the way files are displayed by using the *Change your view* button on the toolbar. Click the down-arrow button on the *Change your view* button on the right side of the toolbar, and then select Large Icons. Take a screenshot of the navigation pane hierarchy by pressing the Print Screen key, opening Paint, and clicking the Paste button on the ribbon. Your screenshot should be similar to the example at right. Save the screenshot as **Project 5A [Your Name]** and print it. Close Paint. The Windows Explorer window should still be open.


Libraries ▸ Pictures ▸ My Pictures ▸ Architecture
Search Architecture
Organize
Share with
Slide show
Burn
New folder
Favorites
Classical Music
Architecture
Desktop
Downloads
Recent Places
Libraries
Documents
Music
My Music
Classical Music
Favorite Tunes
Sheet Music
Public Music
Pictures
My Pictures
Architecture
Old Stuff
Public Pictures
Pictures library
Architecture
Arrange by: Folder
Background
1 item State: Shared

12. You can search for files using the Search box in the top right corner of the Windows Explorer window. Click the Libraries link in the navigation pane. The Search box should now contain the text "Search Libraries." Click the Search box and select *Type:* from the *Add a search filter* section. Select *.jpg*. A list of JPEG files should appear. Right-click one of the files and select Properties from the shortcut menu. Examine the information on the Details tab.

13. Take a screenshot of your file listing and paste it into Paint. It should look similar to the example at right. Save the image as **Project 5B [Your Name]** and print it. Close all open windows.


Search Results in Libraries ▸
type:=jpg
Organize
Open
Share with
Save search
Favorites
Classical Music
Architecture
Desktop
Downloads
Recent Places
Libraries
Documents
Music
My Music
Classical Music
Favorite Tunes
Sheet Music
Public Music
Pictures
My Pictures
Architecture
Old Stuff
Public Pictures
Chrysanthemum
Lighthouse
Tulips
Tulips
Desert
Hydrangeas
Jellyfish
Koala
Penguins
Hydrangeas
JPG File
State: Shared
Date taken: 3/24/2008 4:41 PM
Hydrangeas Properties
General
Security
Details
Previous Versions
Remove Properties and Personal Information
OK
Cancel
Apply
4:39 PM

Property	Value
Description	
Title	
Subject	
Rating	★★★☆☆
Tags	
Comments	
Origin	
Authors	Amish Patel
Date taken	3/24/2008 4:41 PM
Program name	
Date acquired	
Copyright	Microsoft Corporation
Image	
Image ID	
Dimensions	1024 x 768
Width	1024 pixels
Height	768 pixels

14. Open the Recycle Bin using its icon on the desktop and select the Details view. If you can't view the file sizes, click the right-arrow button on the bottom scroll bar to scroll the screen to the right. Sort the files from largest to smallest by clicking the Size button. Write down the name and size of the largest file and the largest folder.

15. Consolidate the deliverables for Project 5 into printed format, a document file, or an e-mail message as specified by your instructor.

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Issue

Are deleted files legally garbage?

In a highly publicized drug case, police searched through trash bags left on the curb by a suspected cocaine dealer. The evidence they collected led to a conviction, which was appealed because the police had not obtained a search warrant. The conviction was upheld by the U.S. Supreme Court, which ruled that garbage left on the curb is in the public domain and police can search it without a warrant.

What does this case have to do with computers? Files you delete from your PC's hard disk are marked for deletion and transferred to the Recycle Bin. Even emptying the Recycle Bin does not actually erase your files from the disk. Instead, the file data remains on the disk until the operating system needs those sectors for new data. Only then is the data in those sectors overwritten.

Deleted data might remain on a disk for years. Anyone who is sophisticated in the use of computers can rummage through this file garbage, but is it legal and ethical to do so?

Your computer is not on the curb, so it is not in the public domain. The files it contains are protected by laws that make it illegal for high-tech thieves to gain unauthorized access and that prevent law enforcement agents from search and seizure without a search warrant. But suppose you donate your computer to a school or take it to a recycling plant? Even if you go through your file list, carefully delete your personal data, and empty the Recycle Bin, parts of your files remain in sectors marked for deletion. With special software, it is easy to search for and view the sectors that contain deleted files.

To avoid identity theft from your discarded computer equipment, you can run **file shredder software** to overwrite all hard disk sectors with random bits. This software does a pretty good job of making your old data inaccessible.

What do you think?

1. Have you ever used file shredder software? ○ Yes ○ No ○ Not sure
2. Do you agree with the U.S. Supreme Court ruling that curbside garbage is in the public domain? ○ Yes ○ No ○ Not sure
3. Are you familiar with the laws in your country or state that limit access to the data on your computer? ○ Yes ○ No ○ Not sure

Save It!

QuickCheck A

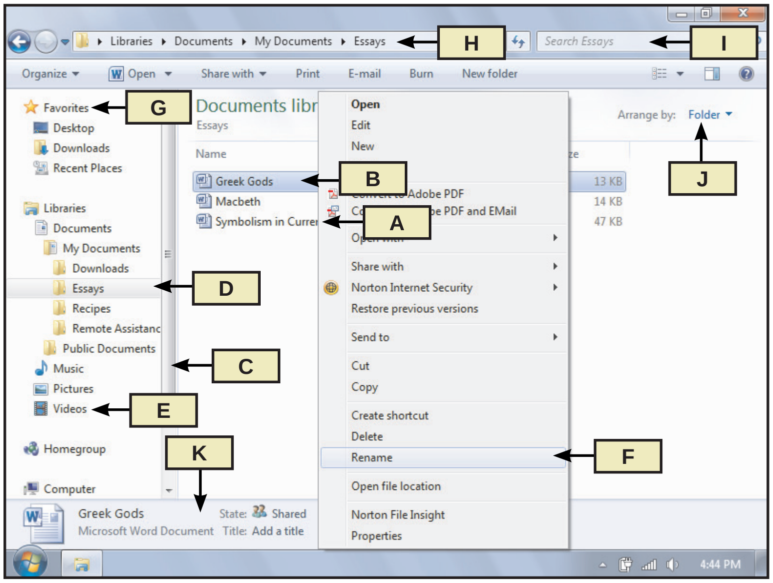
1. When you move a file, Windows uses the __________ as a temporary holding area until you paste the file in its new location.
2. A(n) __________ holds pointers to files and they are handy for organizing files from more than one folder or storage device.
3. True or false? When you burn a DVD, selecting the mastered option is best if you want to play the disc in a standalone home theater DVD player. __________
4. True or false? The Recycle Bin allows you to recover files that you have mistakenly deleted from a hard disk. __________
5. When you rename a file, you should make sure that you maintain the same file __________ .

CheckIt!

QuickCheck B

For each description below, enter the letter of the corresponding object.

1. The address bar __________
2. The subfolder that contains the files listed in the file list __________
3. The file that's being renamed __________
4. The selected file's path __________
5. The details pane __________


Libraries ▸ Documents ▸ My Documents ▸ Essays
H
Search Essays
I
Organize
Open
Share with
Print
E-mail
Burn
New folder
Favorites
G
Desktop
Downloads
Recent Places
Libraries
Documents
My Documents
Downloads
Essays
D
Recipes
Remote Assistanc
Public Documents
C
Music
Pictures
Videos
E
Homegroup
K
Computer
Documents libr
Essays
Name
Greek Gods
B
Macbeth
Symbolism in Currer
A
Arrange by: Folder
J
13 KB
14 KB
47 KB
Open
Edit
New
Adobe PDF
be PDF and EMail
Share with
Norton Internet Security
Restore previous versions
Send to
Cut
Copy
Create shortcut
Delete
Rename
F
Open file location
Norton File Insight
Properties
Greek Gods
Microsoft Word Document
State: Shared
Title: Add a title
4:44 PM

CheckIt!

GetIt?

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 5.

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CHAPTER 6

Protecting Your Files

What's Inside?

Chapter 6 presents the gruesome details on the disasters that might befall your important data files—fires, floods, hurricanes, tornados, viruses, head crashes, and hard drive failures. It includes tips for avoiding some disasters and recovering from those disasters that you can't prevent.

- **FAQs:**
  - What should I know about losing data? 81
  - How can I protect my files from viruses? 82
  - How do I protect files I'm working with? 83
  - How do I use Backup and Restore? 84
  - When should I make a system repair disc? 86
  - What's a simple and dependable backup plan? 87
- **Hardware:** Safety equipment 88
- **Project:** Explore file protection measures 91
- **Issue:** What about a "good" virus? 94
- **QuickChecks** 95

What's on the CD?

Losing files can cost you time and money. Chapter 6 not only exposes you to possible ways you can lose your data, but also teaches you precautionary measures that you can take before disaster strikes. View these screen tours to see how you can protect your data.

- Watch a hard disk head crash! 81
- Go on a virus hunt 82
- Activate Windows automated backup 84
- Find out how to restore individual files from your backup 85

FAQ What should I know about losing data?

Hardware failures that affect your computer circuitry and storage devices can be caused by defective components or by unfortunate events such as human error, fires and floods, power spikes, or power loss. If you understand where risks originate, you can take steps to prevent them and be prepared to repair the damage they cause.

A simple way to lose the data in a file is to copy over it with another file. This human error is especially common while saving multiple versions of files or maintaining backups. Also, CDs, DVDs, and USB flash drives are surprisingly easy to lose, and they can be damaged to the point they become unusable. If you misplace removable media that contains the sole copy of an important file, your only recourse is to try reconstructing it from memory.

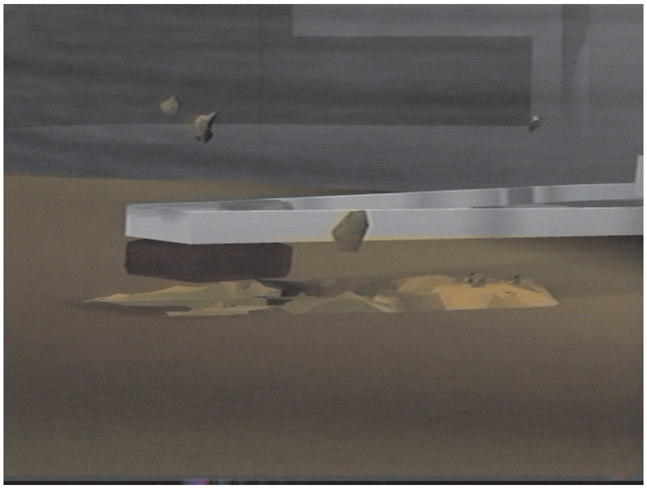
Computer files can become corrupted when they are not closed properly and for other sometimes unknown reasons. A **corrupted file** is damaged and either won't open, doesn't work properly, or interferes with other software. Corrupted operating system files are especially notorious for disrupting computer operations, sometimes denying access to your files or preventing your computer from booting.

Malicious software, such as computer viruses and worms, can alter the data on your computer. Some infections are limited to one or two files that can be disinfected, but a stubborn virus might not be dislodged without abandoning many of your files and essentially rebuilding your hard disk drive's data from scratch.

One of the most disastrous events that can strike a computer is a **head crash**. During normal operation, the read-write head of your hard drive hovers just above the disk surface, but does not touch it. If a drive malfunctions or gets knocked about, however, its read-write head might literally crash into the disk surface and damage the sectors that hold your data. Click the Play It! button in Figure 6-1 to see what happens when your computer's hard drive crashes.

Play It!

Figure 6-1



In the worst case, sectors damaged during a head crash are part of the Registry that keeps track of file locations on your hard disk. If the Registry is corrupted, you might not be able to access your data or program files.

Even if you take preventive measures, your computer can lose data at any time. Therefore, you should become familiar with the tools that exist for protecting your data against events such as head crashes and for restoring data after a drive failure.

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FAQ How can I protect my files from viruses?

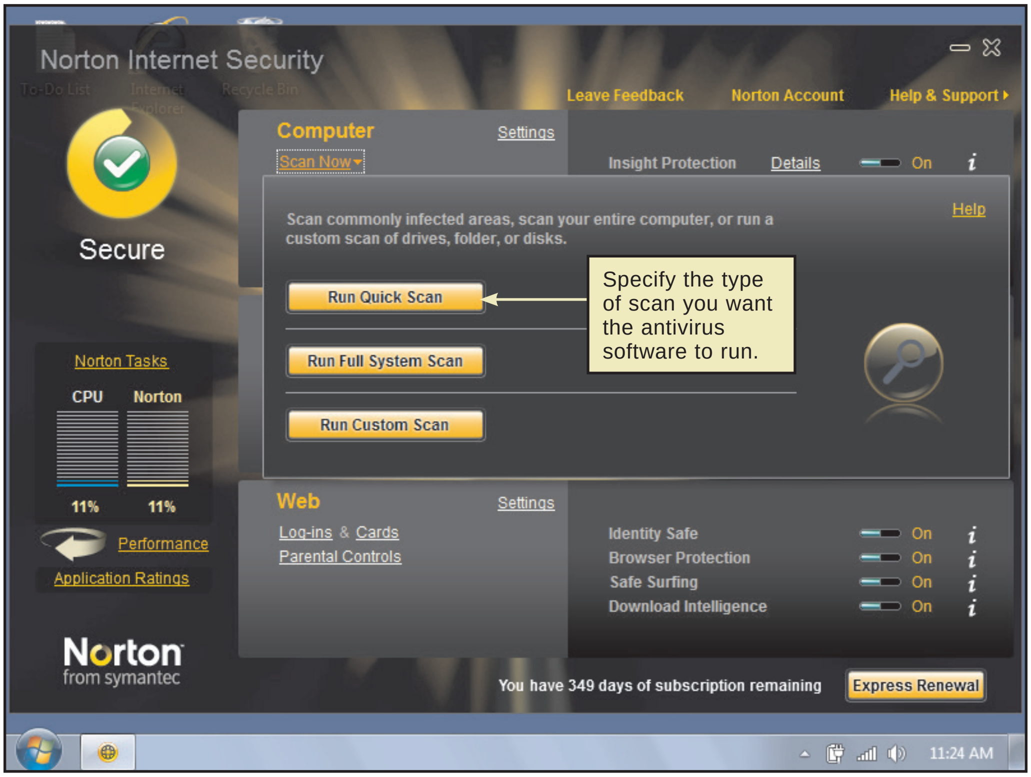
A **virus** is a small computer program that can attach itself to a legitimate computer file, replicate itself to other programs, and deliver various payloads, such as deleting all the music files on your computer's hard disk. Other types of malicious software include **worms** that spread from one computer to another, allowing a hacker in a remote location to access your hard disk, steal your data, and use your computer as a launching point for mass mailings called spam or other illicit activities. To protect your computer from malicious attacks, experts recommend that you practice "safe computing" by installing antivirus software.

Antivirus software works in the background whenever your computer is on. It scans for virus signatures in e-mail attachments, downloads, and files that you access from USB flash drives, CDs, DVDs, or the Web. A **virus signature** is a series of unique bytes that, like a fingerprint, uniquely identifies a virus and distinguishes it from legitimate files on your PC. Virus signatures are stored in a virus database. Because new viruses continue to emerge, antivirus software publishers offer periodic updates to the virus database as a download. Popular antivirus software products include Norton AntiVirus, McAfee VirusScan, ALWIL avast!, and open source ClamWin.

If a virus slips through your antivirus software, it can sometimes be removed without damaging files. In some cases, however, one or more files can be irreparably damaged. As with other computer disasters, your final defense against viruses lies in regular computer backups. Click the Try It! button to find out how to scan for viruses using antivirus software.

Try It!

Figure 6-2


Norton Internet Security
To-Do List
Internet Explorer
Recycle Bin
Leave Feedback
Norton Account
Help & Support
Computer
Settings
Scan Now
Insight Protection
Details
On
Help
Secure
Run Quick Scan
Run Full System Scan
Run Custom Scan
Norton Tasks
CPU
Norton
11%
11%
Performance
Application Ratings
Web
Settings
Log-ins & Cards
Parental Controls
Identity Safe
On
Browser Protection
On
Safe Surfing
On
Download Intelligence
On
Norton from symantec
Express Renewal
11:24 AM

Scan commonly infected areas, scan your entire computer, or run a custom scan of drives, folder, or disks.

You have 349 days of subscription remaining

Specify the type of scan you want the antivirus software to run.

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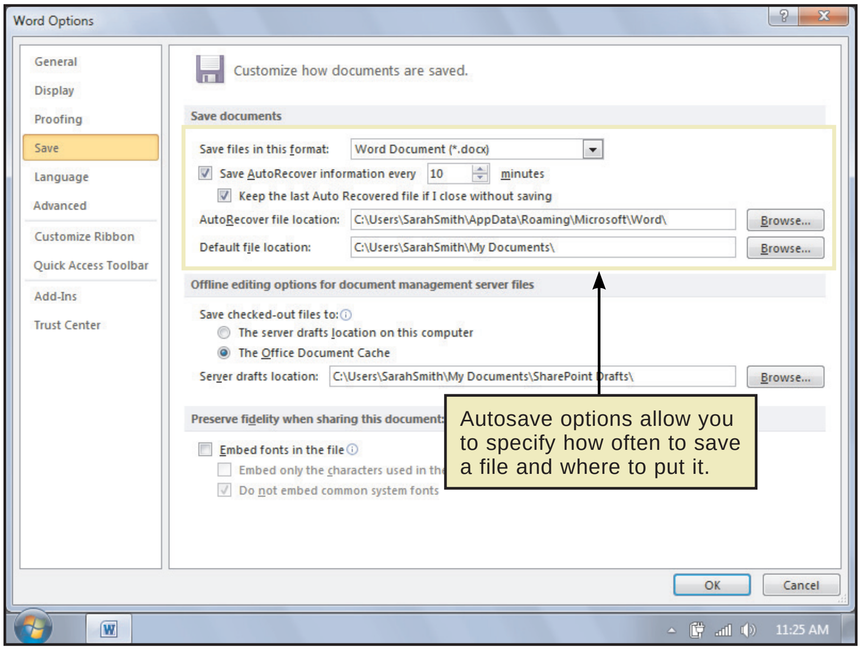
FAQ How do I protect the files I'm working with?

A data file is most vulnerable while you are working with it. If an application hangs up and you have to use the Task Manager to close a non-responding program, the file that you're working with might not close properly and become corrupted. Hardware malfunctions and power problems can also corrupt open files.

Many applications offer an **autosave** option that automatically makes copies of files as you are working with them. If available, make sure this feature is activated. You might have the option of specifying where and how frequently autosaved data is stored.

Most applications that autosave files can sense when a file has been corrupted, in which case they will automatically revert to an autosaved copy. When using new software, check the way its autosave feature works. Take note of the location of autosaved files in case you are required to access them manually. Figure 6-3 illustrates autosave options for Microsoft Word.

Figure 6-3



Customize how documents are saved.

Save documents

Save files in this format: Word Document (*.docx)

☑ Save AutoRecover information every 10 minutes

☑ Keep the last Auto Recovered file if I close without saving

AutoRecover file location: C:\Users\SarahSmith\AppData\Roaming\Microsoft\Word\

Default file location: C:\Users\SarahSmith\My Documents\

Offline editing options for document management server files

Save checked-out files to:

○ The server drafts location on this computer

● The Office Document Cache

Server drafts location: C:\Users\SarahSmith\My Documents\SharePoint Drafts\

Preserve fidelity when sharing this document:

☐ Embed fonts in the file

☐ Embed only the characters used in the

☑ Do not embed common system fonts

Autosave options allow you to specify how often to save a file and where to put it.

Another strategy for protecting important files you're working with is to manually copy them to a USB flash drive, external hard disk, CD, or DVD. To copy files to a flash drive or external hard disk, open the Computer folder and use the copy procedure you learned in the previous chapter. To copy files to a CD or DVD, use the Live File System burn procedure you learned in the previous chapter.

Retrieving files that you've copied to CDs, DVDs, flash drives, and external hard drives is easy. You simply copy files from these storage media back to your hard disk. For example, suppose you discover that you inadvertently deleted an important file and you've just emptied your computer's Recycle Bin. If you have a copy of the file stored on a USB flash drive, you can open the Computer folder and copy the file back onto the hard disk.

The advantage of a manual backup is that you can copy important files as you create them. The process is simple and it just takes a few moments. The disadvantage is that you have to remember to make copies and you have to remember where you put them, a task that gets more difficult if you build up lots of files and store them haphazardly on various flash drives, CDs, and other media. For a more comprehensive backup, you need a different plan.

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FAQ How do I use Backup and Restore?

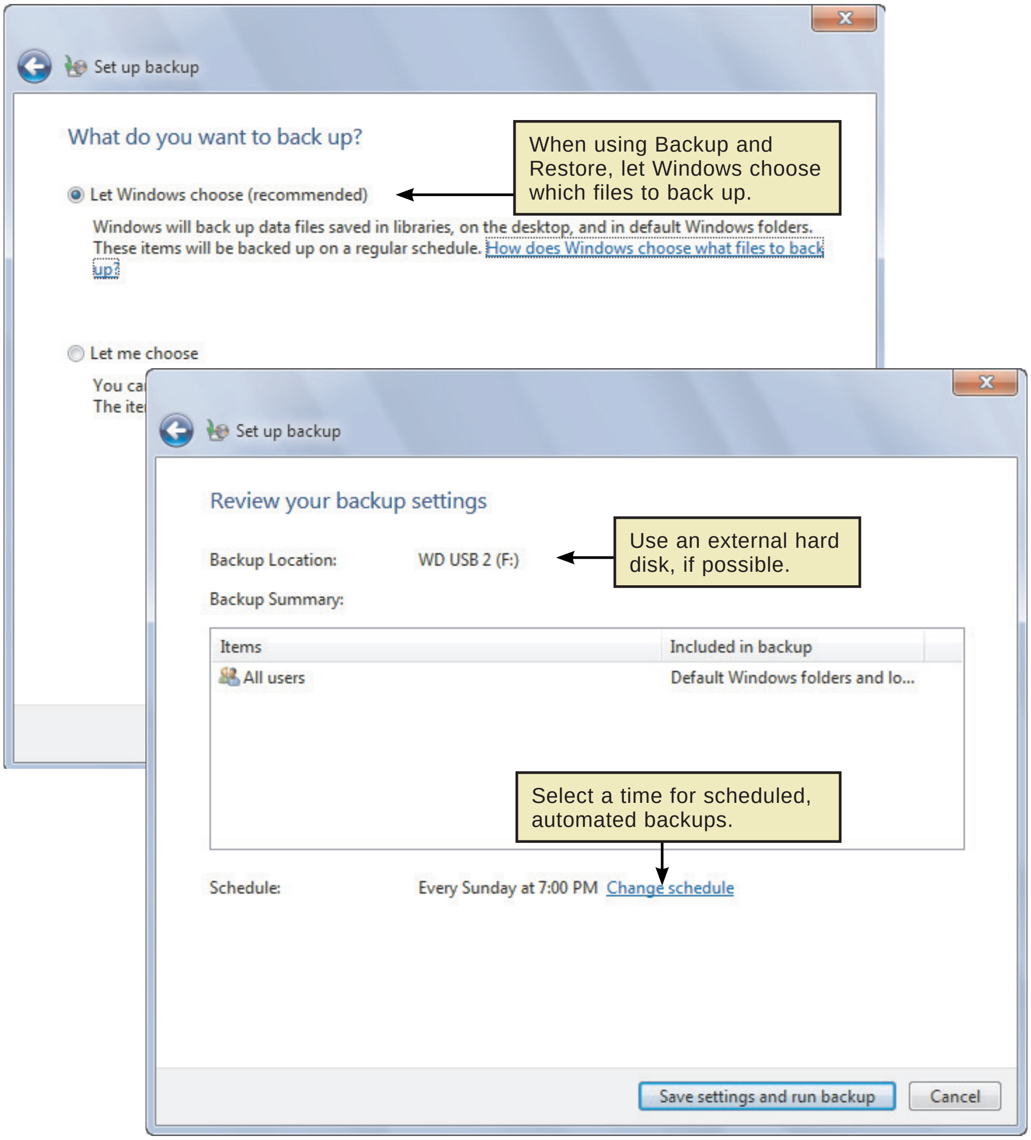
A collection of files copied as a precaution against data loss is generally referred to as a **backup**. **Backup software** is designed to automate the process of copying data and program files that can later be retrieved to replace damaged or lost files. Windows 7 includes software called Backup and Restore that you can use for a comprehensive backup.

Backup and Restore offers several options, but its basic setup is quite easy to use. An external drive approximately the same size as your computer's hard disk is recommended. A smaller external drive will work if the internal drive is not full.

The first time you create a backup, choose the *Set up backup* option and use it to specify the day and time you'd like backups to take place. As shown in Figure 6-4, simply let Windows choose which files to back up to make sure the backup contains all your computer settings, as well as your programs and data. Click the Try It! button to step through the process of setting up your first backup.

Try It!

Figure 6-4



What do you want to back up?

● Let Windows choose (recommended)

Windows will back up data files saved in libraries, on the desktop, and in default Windows folders. These items will be backed up on a regular schedule. How does Windows choose what files to back up?

○ Let me choose

You ca
The ite

When using Backup and Restore, let Windows choose which files to back up.

Review your backup settings

Backup Location: WD USB 2 (F:)

Use an external hard disk, if possible.

Backup Summary:

Items	Included in backup
All users	Default Windows folders and lo...

Select a time for scheduled, automated backups.

Schedule: Every Sunday at 7:00 PM Change schedule

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• How do I use Backup and Restore? (continued)

Backup software does more than simply copy files from your computer's hard disk to an auxiliary storage device. The backup process combines and compresses files into a specially formatted set of files. These files cannot be copied back to the original disk by simply using the Copy command. Instead, you have to use Backup and Restore to retrieve files from a backup and place them back on the original disk or its replacement. Retrieving files from a backup is usually referred to as the **restore** process.

Backup and Restore produces a backup that contains two elements: a system image and user folders. You use each element for a different purpose.

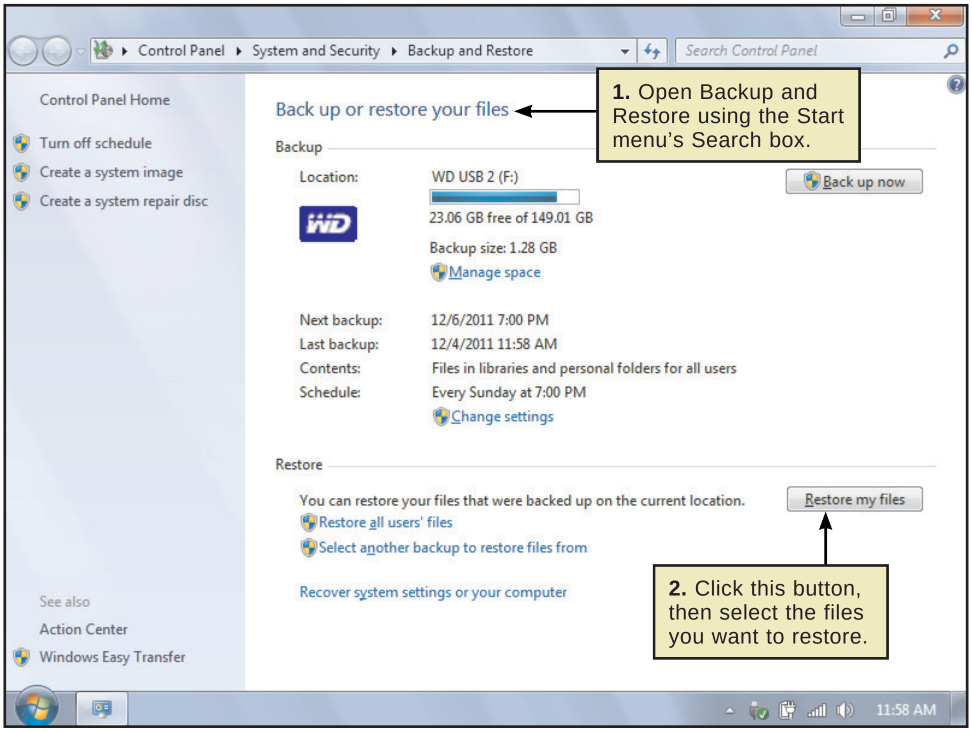
A **system image** is an exact copy of all the files stored on a drive, including the operating system, system settings, programs, and data. A system image is stored in a folder called WindowsImageBackup. Files in this folder cannot be accessed individually. You have to install the entire image.

A system image is used to restore your computer when a massive hard drive failure requires a replacement drive, which is typically blank. You'll need a system repair disk to get your computer started and access the tools necessary to start the restore process. Restoring the system image populates your replacement hard disk with all the files you had at the time of your last backup.

In addition to the system image, Windows backs up data files that are saved in libraries, in personal folders, and on the desktop for all user accounts. These files are stored in a backup file identified by your user name, such as SarahSmith-WIN7. Backup and Restore gives you the option to restore all of these files, which is the option you'd select after a hard drive failure. Alternatively, you can select individual files to restore if, for example, one of your original files becomes corrupted or is inadvertently deleted. Work with the Try It! in Figure 6-5 to learn how to restore individual data files that inadvertently got deleted from the hard disk.

TryIt!

Figure 6-5


Control Panel ▸ System and Security ▸ Backup and Restore
Search Control Panel
Control Panel Home
Turn off schedule
Create a system image
Create a system repair disc
See also
Action Center
Windows Easy Transfer
Back up or restore your files
Backup
Back up now
Manage space
Change settings
Restore
Restore my files
Restore all users' files
Select another backup to restore files from
Recover system settings or your computer
11:58 AM

Location: WD USB 2 (F:)
23.06 GB free of 149.01 GB
Backup size: 1.28 GB

Next backup: 12/6/2011 7:00 PM
Last backup: 12/4/2011 11:58 AM
Contents: Files in libraries and personal folders for all users
Schedule: Every Sunday at 7:00 PM

You can restore your files that were backed up on the current location.

1. Open Backup and Restore using the Start menu's Search box.

2. Click this button, then select the files you want to restore.

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FAQ When should I make a system repair disc?

Okay, let's suppose that your computer won't boot and you're afraid that your hard disk drive is no longer working. When your computer won't boot, it can't load Windows and you have no access to software or tools that reside on the hard disk.

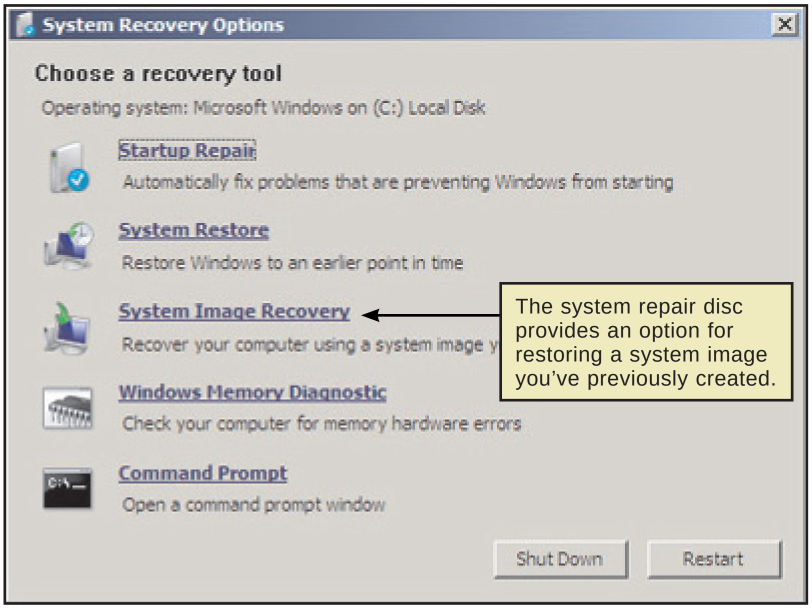
The situation gets even more grim if your hard disk has failed and has to be replaced with a new, blank drive. Here's the catch: Your system image can't be restored unless you can run Backup and Restore. But you can't access Backup and Restore from the hard drive because it is blank. How can you get your computer started so that you can load Windows and then restore your programs and data?

When your computer's hard drive malfunctions, you need a **system repair disc** that will boot your computer from the CD/DVD drive or USB flash drive and help you install Windows along with the Backup and Restore software. You need to have made this disc before your computer malfunctioned.

The best time to make a system repair disc is when you first set up your computer. Open Backup and Restore, then click the option for creating a system repair disc. Insert a DVD and then follow the instructions on the screen. Label the disc and store it in a safe place. System repair discs may contain settings specific to a particular computer, so make sure you have one for every computer you own.

To use a system repair disc, insert it in the DVD drive. You might have to insert the end of a paperclip in the small hole in the drive tray to open it while the computer is turned off. With the disc in the drive, turn on the computer power. Watch the screen and be prepared to press the F12 key to get the boot manager and tell the computer that you want to boot from the DVD drive. To reinstall Windows and recover your data and program files, look for the System Image Recovery option shown in Figure 6-6.

Figure 6-6



System Recovery Options

Choose a recovery tool

Operating system: Microsoft Windows on (C:) Local Disk

Startup Repair
Automatically fix problems that are preventing Windows from starting

System Restore
Restore Windows to an earlier point in time

System Image Recovery
Recover your computer using a system image y

Windows Memory Diagnostic
Check your computer for memory hardware errors

Command Prompt
Open a command prompt window

The system repair disc provides an option for restoring a system image you've previously created.

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FAQ What's a simple and dependable backup plan?

A dependable basic backup plan should be easy to set up and as automated as possible. Windows 7 offers a collection of backup and restore tools, some of them designed for technical users. Third-party tools are also available in stores and at download sites. Rather than get embroiled in arcane backup options, you'll have a serviceable backup plan by following these four steps:

1. Make a system repair disc. When you get a new computer, make a system repair disc (or USB flash drive) right away. Label the disc and keep it in a safe place.

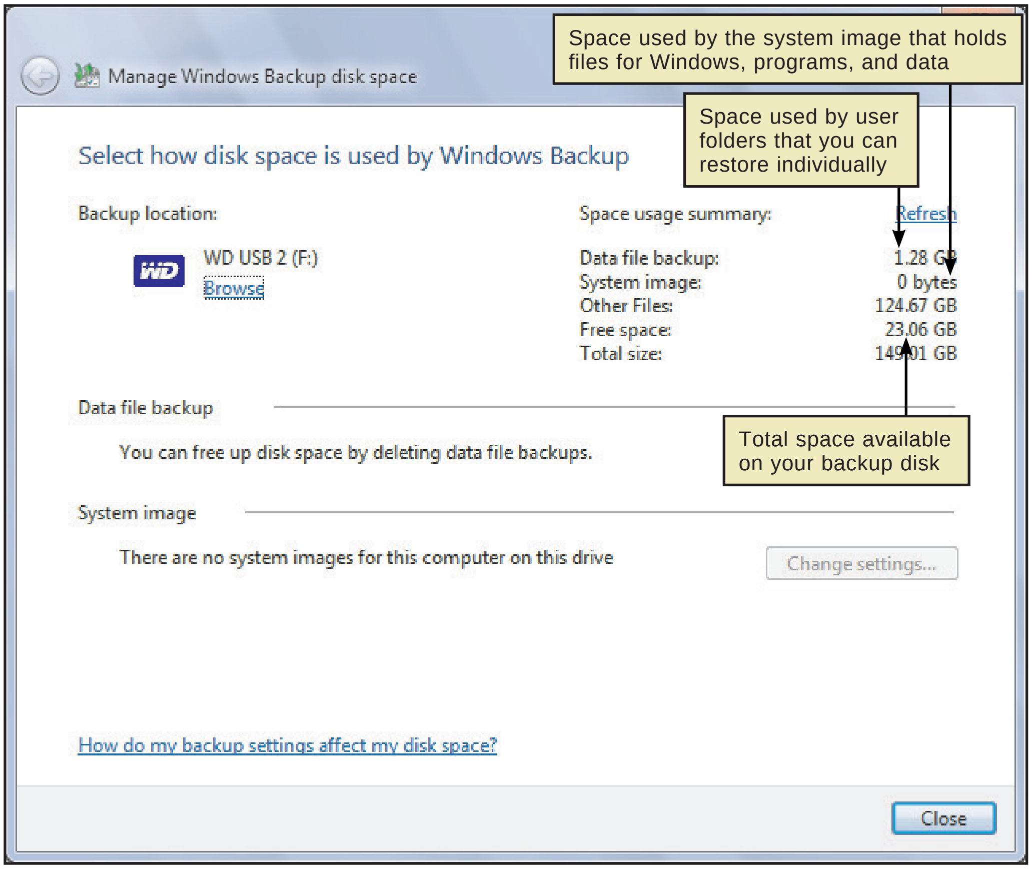
2. Make weekly backups. Set up Backup and Restore to make weekly backups on an external hard disk. Remember that backup files can be accessed and restored individually. The system image has to be installed all at once.

3. Activate autosave. Make sure the autosave feature of your software applications is activated and you know where to find the backup files on your computer's hard disk.

4. Make copies of important files. When working on an important file, periodically copy it to a USB flash drive, CD, or DVD. If your system backups are scheduled for once a week, then you could potentially lose a week's worth of data. Copying individual files to an auxiliary storage device in between backups can save you the aggravation of trying to reconstruct a file that didn't get backed up.

From time to time, you might want to check the space available on your backup drive. To do so, start Backup and Restore and then select the option to manage space. Figure 6-7 explains the information available about your backup drive.

Figure 6-7



Manage Windows Backup disk space

Select how disk space is used by Windows Backup

Backup location:

WD USB 2 (F:)
Browse

Space usage summary: Refresh

Data file backup:	1.28 GB
System image:	0 bytes
Other Files:	124.67 GB
Free space:	23.06 GB
Total size:	149.01 GB

Data file backup

You can free up disk space by deleting data file backups.

System image

There are no system images for this computer on this drive

Space used by the system image that holds files for Windows, programs, and data

Space used by user folders that you can restore individually

Total space available on your backup disk

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Hardware

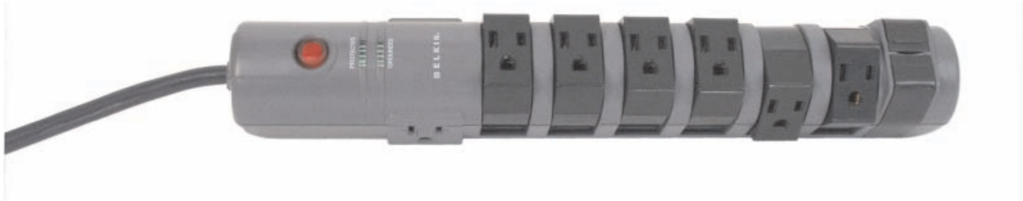
Safety equipment

In addition to using antivirus software and making backups, you can take hardware-related steps to minimize your risk of losing data. Treat your computer with care to protect it from physical damage. When transporting your computer, try to avoid unnecessary bumps and don't drop it.

Electronic equipment is susceptible to power surges or spikes. A **power spike** is a short duration change in voltage, current, or energy in an electrical circuit. A power surge is similar to a spike, but is usually a slightly lower voltage and lasts a bit longer. Spikes and surges can be caused by lightning, power outages, short circuits, or malfunctions with power company equipment. When excessive current flows into an electronic device, circuits and chips can overheat and become permanently damaged.

A **surge protector** is a device that is designed to maintain safe voltage levels by filtering out surges and spikes. To prevent power anomalies from damaging your computer, plug a surge protector into a wall outlet, and then plug your computer into the surge protector. Surge protectors, sometimes called surge suppressors, surge strips, or power strips, come in a variety of styles, but a six-outlet configuration similar to the one shown in Figure 6-8 is most popular.

Figure 6-8



Although they look similar, surge protectors are not the same as multiple outlet strips that are designed to simply expand the number of devices you can plug into an outlet. When you shop for a surge protector, make sure the packaging mentions surge protection. Surge protectors are rated by the number of joules they can absorb before failing. A higher rating means greater protection. Look for surge protectors with a rating of 1,000 joules or more.

Surge protectors contain sensors that measure the flow of power and divert excess voltage from the circuit. After repeated surges, this protective circuitry can burn out, leaving your computer unprotected. Periodically, you should check the status light on your surge strip to make sure the unit is operating correctly.

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Hardware
(continued)

A surge protector guards against power spikes, but offers no protection if the power fails. A **UPS** (uninterruptible power supply) stores power in its battery, which can be used by any connected device in the event of a power outage. UPSs also offer surge protection, so you do not need to use a surge protector when your equipment is plugged into a UPS. Uninterruptible power supplies are also called battery backups.

UPSs are very important for desktop computers that require power from an AC wall outlet. When a desktop computer loses power, the contents of its memory are instantly erased. When power fails, the computer can lose documents you are in the process of creating but have not yet saved. It can also lose changes you've made to existing files, but haven't saved.

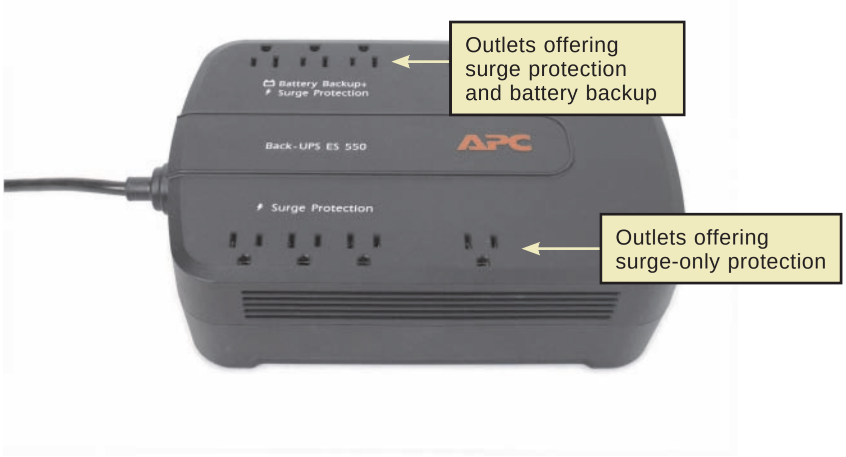
Portable computers run on battery power and so the data you're working on is not immediately affected by a power outage. Although you don't need a UPS to keep your notebook or netbook computer running during an outage, a UPS can be a useful piece of equipment. During an outage, your portable computer will work, but you might not be able to access your local area network or the Internet if your networking devices lose power. To maintain network access during a power outage, make sure network devices, such as your cable modem and router, are connected to a UPS.

The length of time a device continues to run on UPS power varies from several minutes to a couple of hours, depending on the size of the UPS and the power requirements for the electronic devices that are connected to it. A UPS should have enough stored power to keep a desktop computer and monitor running long enough to save files, close programs, and shut down gracefully. A UPS that is only powering network devices can typically operate for several hours.

The battery capacity of a UPS is rated by watts or VA (volt-amperes). A low-capacity UPS suitable for powering a few small network devices might be rated 350VA, whereas a high-capacity UPS might be rated 750VA. If you have questions about the size of UPS required to keep your computer equipment running during a power outage, Web sites for UPS manufacturers such as American Power Conversion (www.apc.com) offer interactive guides to help you make the right selection.

Most UPSs include a set of outlets connected to the backup battery, and a set of outlets that offer surge protection but not battery backup. Make sure your computer and networking equipment are plugged into the outlets with battery backup. Your printer and second monitor should be connected to the surge-only outlets because they are not necessary for basic computing activities and place a big drain on the UPS battery. Figure 6-9 illustrates surge-only and battery-powered outlets on a mid-size workstation UPS.

Figure 6-9


Outlets offering surge protection and battery backup
Battery Backup+ Surge Protection
Back-UPS ES 550
APC
Surge Protection
Outlets offering surge-only protection

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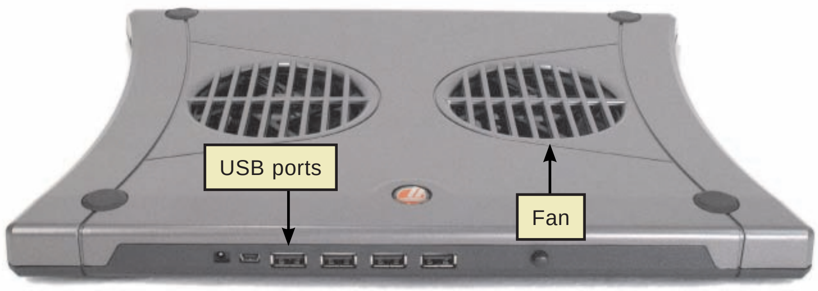
Hardware
(continued)

Most computers include a built-in fan designed to keep circuitry at a safe operating temperature. Many notebook and netbook computers, however, seem to heat up when in use, especially when the microprocessor is busy working with multiple windows and background tasks. Continual operation at high temperatures can reduce the life expectancy of your computer. If you notice the case of your computer getting warm to the touch, you might consider investing in a chill mat, or cooling pad.

A notebook chill mat is a low-profile device housing one or more cooling fans designed to increase air flow to a computer placed above them. The fans typically draw power from one of the computer's USB ports, though some mats are self-powered from a wall outlet. In addition to cooling the computer, many chill mats also include USB ports that can be used for USB flash drives, printers, and other devices.

Figure 6-10



In addition to using a surge strip, UPS, and chill mat, you can protect important data by keeping your computer in a safe place where it won't tempt thieves. The incidence of computer theft is increasing. Notebook computers are especially vulnerable because they are easy to carry and are too often left casually lying about in public areas.

The value of a stolen computer is not measured simply by the replacement cost of the hardware; typically the data it contains is even more valuable. You might not consider your school assignments valuable data, and you're right; that's not what thieves are after. Much more valuable are records of your transactions: the online purchase confirmations that include your credit card number, your school registration that includes your Social Security number, your online tax returns, and your "secret" file of passwords and checking account numbers. There is enough data stored in an average computer to make an identity thief quite happy.

Don't leave your computer unattended in a library, coffee shop, or other public place. Consider locking your computer in a drawer or cabinet when you are not using it. You can also secure your computer with a lock when you leave it at home or in your dorm room. Most computers are equipped with a Kensington Security Slot where you can attach a steel cable and lock it around a table leg. Although this locking mechanism might not prevent a determined burglar, it will certainly discourage opportunistic pilfering by someone passing by who sees an unguarded computer.

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Project

Explore file protection measures

This chapter introduced several ways you can lose your data and provided tips on how to protect and recover your files. Windows system tools, such as the Restore feature and Automatic Backup, require an administrator password to keep unauthorized users from adversely affecting your system. Without an administrator account, however, you can still back up your personal folders manually.

When you have completed the project, you should be able to:

- Check your antivirus software's status.
- Determine storage requirements for your personal folders.
- Set up automatic file backups.
- Create a system repair disc.

Requirements: This project requires antivirus software, Microsoft Windows 7, and Paint. Beginning with Step 8, you will need an administrator account and two blank CDs or DVDs. E-mail and word processing software are optional for submitting deliverables.

Deliverables:

1 The name and status of your antivirus software

2 The storage space required to back up your My Documents folder

3 The storage space required to back up your My Pictures folder

4 The storage space required to back up your My Music folder

5 The number of CDs and standard DVDs required to back up the three folders

6 A backup plan for your My Documents, My Pictures, and My Music folders

7 A screenshot of your automatic file backup settings

1. To make sure your antivirus software is active and up to date, first look for it in the taskbar notification area. If you're not sure what the icon looks like, rest your pointer on each icon in the notification area to view the ScreenTip. If you still can't find the icon, click the ▲ symbol to display any hidden icons. Write down the name of your antivirus software.

2. To check your antivirus program's status, click its icon. The screen displayed should indicate whether the program is active and has all the latest updates. Write down the status of your antivirus program. If it's not active or up to date, follow the program's instructions for activating it or downloading the latest updates. Close your antivirus program.

3. In addition to protecting your data with antivirus software, it's a good idea to back up all your important files. Suppose you want to make copies of your My Documents, My Pictures, and My Music folders. It's helpful to estimate the amount of space you'll need so you can choose the right storage media. Access your personal folders by clicking your user ID in the Start menu.

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• Explore file protection measures (continued)

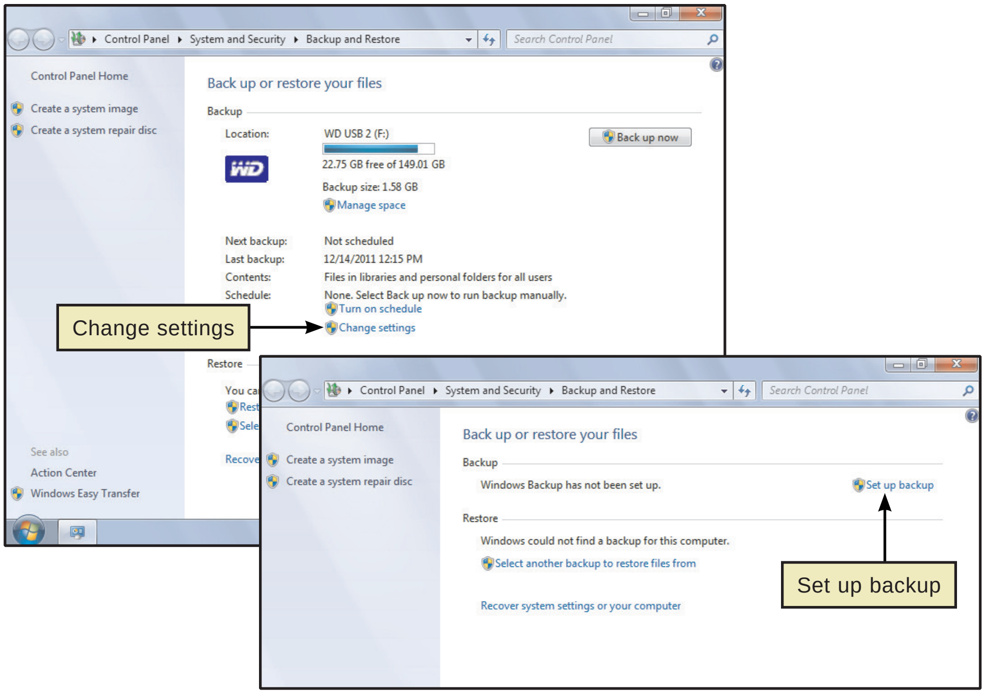
4. Right-click the My Documents folder and select Properties to view the total size of all files in the folder. Write down the size and make sure you note whether it is measured in kilobytes (KB), megabytes (MB), or gigabytes (GB).

5. Next, check the storage space required for your My Pictures and My Music folders. Write down the sizes for all files in the My Pictures and My Music folders.

6. Using the figures you wrote down in Steps 4 and 5, compute the total storage space you need and choose the best storage medium to hold a copy of your important files. If your files require less than 700 MB, you can use a CD. If your files require more than 1000 MB of space, convert the required space into gigabytes by dividing by 1,000. (For example, 2500 MB would be 2.5 GB.) A standard DVD holds 4.7 GB. A double-layer DVD holds about 8 GB. How many CDs are required to hold your data? How many standard DVDs?

7. Consider your best plan for making a file backup. You might want to spread files over more than one disc, or store some files on a CD, some on a DVD, and others on a USB flash drive. If you're considering a USB flash drive, check its storage capacity. Write a one- to two-paragraph description of your file backup plan.

8. Beyond this point in the project, you will need an administrator account to check your backup settings. Open Backup and Restore from the Start menu's Search box. If the Backup and Restore window offers an option to *Change settings*, click it; otherwise, click *Set up backup*. Place an empty CD or DVD in your CD/DVD drive.


Control Panel ▸ System and Security ▸ Backup and Restore
Search Control Panel
Control Panel Home
Create a system image
Create a system repair disc
Back up or restore your files
Backup
Back up now
Manage space
Turn on schedule
Change settings
Restore
See also
Action Center
Windows Easy Transfer
Control Panel ▸ System and Security ▸ Backup and Restore
Search Control Panel
Control Panel Home
Create a system image
Create a system repair disc
Back up or restore your files
Backup
Set up backup
Restore
Select another backup to restore files from
Recover system settings or your computer

Location: WD USB 2 (F:)
22.75 GB free of 149.01 GB
Backup size: 1.58 GB
Next backup: Not scheduled
Last backup: 12/14/2011 12:15 PM
Contents: Files in libraries and personal folders for all users
Schedule: None. Select Back up now to run backup manually.

Windows Backup has not been set up.
Windows could not find a backup for this computer.

Change settings

Set up backup

9. Under Backup Destination, select your CD/DVD drive, and click Next. Select *Let me choose* and then click Next.

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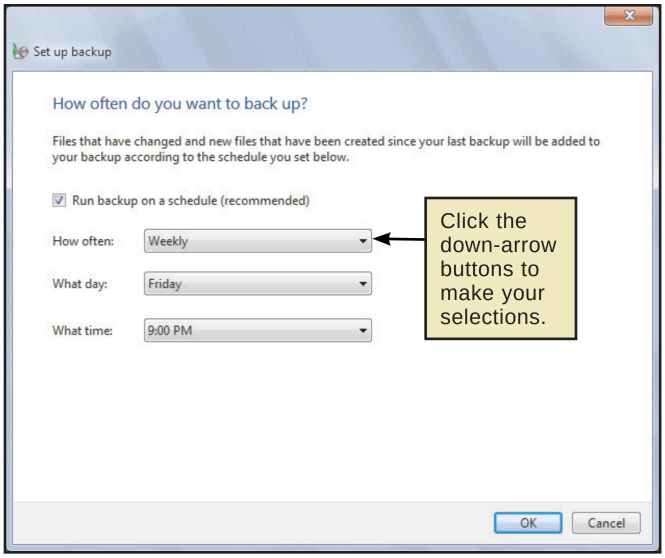
• Explore file protection measures (continued)

10. Make sure there is only a checkmark in your user accounts Data Files checkbox, and then click Next. Click the *Change schedule* link. Set your automated backups to take place weekly on Fridays at 9:00 PM. Click the OK button to save the schedule.



How often do you want to back up?

Files that have changed and new files that have been created since your last backup will be added to your backup according to the schedule you set below.

☑ Run backup on a schedule (recommended)

How often: Weekly

What day: Friday

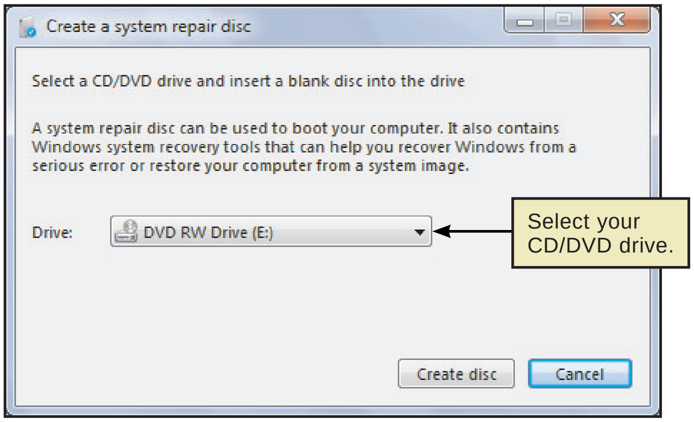
What time: 9:00 PM

Click the down-arrow buttons to make your selections.

11. Use Paint to produce, save, and print a screenshot of the window that displays a review of your backup settings. Use **Project 6 [Your Name]** as the file name.

12. Close Paint. Do not proceed with the backup at this time. Instead, click the Cancel button to close the *Set up backup* window. The Backup and Restore window should still be open.

13. Click the *Create a system repair disc* link on the left side of the window. Make sure your CD/DVD drive is selected, place a blank disc in the drive, and click the *Create disc* button. Label the disc as instructed and make sure you place the disc in a secure location.



Select a CD/DVD drive and insert a blank disc into the drive

A system repair disc can be used to boot your computer. It also contains Windows system recovery tools that can help you recover Windows from a serious error or restore your computer from a system image.

Drive: DVD RW Drive (E:)

Select your CD/DVD drive.

14. Consolidate the deliverables for Project 6 into printed format, a document file, or an e-mail message as specified by your instructor.

Issue

What about a “good” virus?

Like tagging subway cars with spray-painted graffiti, creating a virus or worm has some element of artistry and risk. The artistry lies in the satisfaction of creating a really brilliant program that can elude detection from antivirus software and cause just the right amount of mischief on infected PCs. Some twisted person apparently took much delight in creating a virus that bellows in an Arnold Schwarzenegger-like voice, “Your files have just been TERMINATED!,” as the file names disappear one-by-one from your personal folders.

Creating a virus or worm can be a risky business. Most states have laws that punish deliberate attacks on computer systems. Also, a surprisingly effective ad hoc group of virus watchdogs in the computer community seems to be able to track most malicious software to its source. The authors of several viruses and worms have been caught. Some boast about their exploits. A few innocently claim that their creations inadvertently “escaped” into the wild of public computing and mistakenly infected PCs in businesses, schools, and homes. Other malware authors claim that their work is a public service because it points out security holes and flaws in antivirus software.

According to a recent Microsoft Security Intelligence Report, worms have become more prevalent than viruses. They are increasingly more destructive and consequently more costly. Potential sources of infection are everywhere. Worms sneak into your computer from compromised Web sites, arrive as excess baggage in downloads, and land in your Inbox along with unwelcome spam. When they get past antivirus software, a frustrating amount of time can be spent trying to disinfect your files.

Could there be a “good” worm that can be used to eliminate bad worms? When the vicious Blaster worm wreaked havoc across the globe, a do-gooder released a worm called Nachi as a Blaster antidote. It erased copies of Blaster on infected PCs, then downloaded and installed a Windows update from Microsoft to protect the computer against further Blaster (and Nachi) attacks. However, just as Blaster caused major network traffic, so did Nachi. Still, some believe that the only way to stop major malware epidemics is to out-hack the hackers. Because it is impossible to anticipate interactions between all possible software programs, it is difficult to determine if the benefits of “good” worms might outweigh their risks.

What do you think?

1. Have you ever used a computer that had a virus or worm? ❍ Yes ❍ No ❍ Not sure

2. Have you ever lost a file because of a virus or worm? ❍ Yes ❍ No ❍ Not sure

3. Do you think the benefits of “good” viruses outweigh their risks? ❍ Yes ❍ No ❍ Not sure

Save It!

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QuickCheck A

1. One of the worst disasters that can strike your PC is a hard disk ☐ crash.
2. Antivirus software looks for a unique virus ☐ that identifies the virus and distinguishes it from the legitimate files on your PC.
3. Backup and Restore creates a backup of personal folders and a system ☐ .
4. One of the first things to do when you get a new PC is to make a system ☐ disc.
5. True or false? A UPS also offers surge protection. ☐

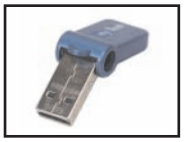
Check It!

QuickCheck B

Select the device that would be best suited to each use.

1. Automatically store a system image every week. ☐
2. Make a copy of the files in your Documents library (200 MB) that you can easily carry with you on a keychain. ☐
3. Store a copy of your favorite digital music files (500 MB) on a medium that you can play in most car stereo systems. ☐
4. Create a backup of a 300 GB hard disk using Backup and Restore. ☐
5. Burn a system repair disc. ☐

A. External 500 GB hard disk drive



B. 6 GB USB flash drive

C. CD/DVD

Check It!

Get It?

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 6.

CHAPTER 7

Connecting to the Internet

What's Inside?

The Internet is in the news and on everyone's mind. Chapter 7 provides the information you need to get connected. In Chapter 8 you'll learn about the Web, and in Chapter 9 you'll learn about e-mail.

- **FAQs:**
  - What is the Internet? 97
  - What are the options for Internet service? 98
  - What is an IP address? 100
  - How do I avoid online intrusions? 101
- **Hardware:** Wired and wireless network devices 102
- **Project:** Explore your Internet connection 105
- **Issue:** Do we need anonymous digital cash? 108
- **QuickChecks** 109

What's on the CD?

Because the Internet has so much to offer, the pages in Chapter 7 can merely get you started on an exploration of the fascinating Internet world called cyberspace.

- Discover how to test your Internet connection speed 99
- Learn how to locate your IP address 100
- Find out how to test your computer for vulnerabilities to online intrusions 101
- See how easy it is to assemble a network that includes a router 104

FAQ What is the Internet?

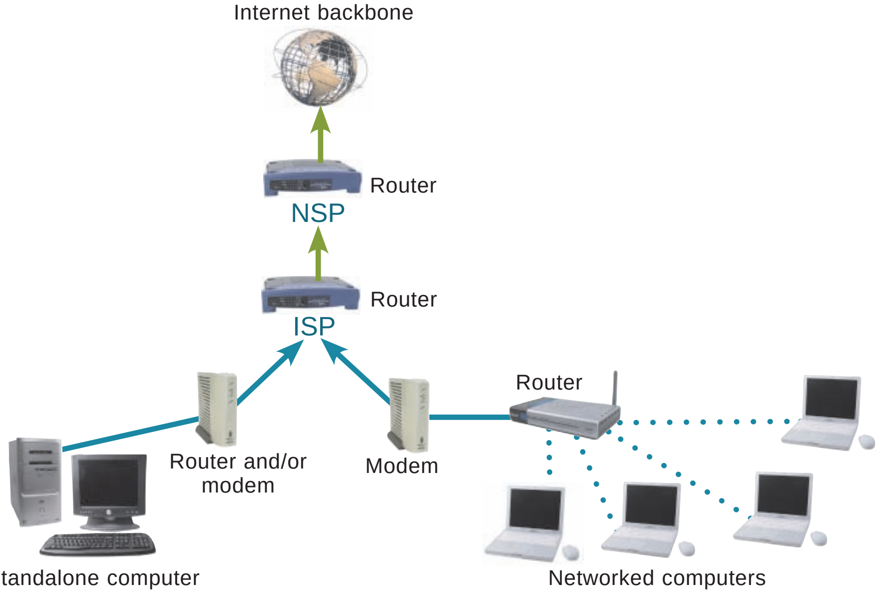
A **computer network** is a collection of computers and related devices that are linked to share data, hardware, and software. The largest computer network is the **Internet**. The Internet is composed of computers and other devices that exchange data using a standard protocol called **TCP/IP**. This protocol divides documents, e-mail, photos, and other digital messages into standard-sized **packets** of data. Surprisingly, the Internet is not owned or operated by any single corporation or government. Instead, it grew over time in a somewhat haphazard configuration as networks connected to other networks and to the Internet backbone.

The **Internet backbone** is a network of high-capacity communications links that provide the main routes for data traffic across the Internet. At one time, the organization of the Internet backbone and interconnected networks resembled a spine with ribs connected along its length. Today, however, it is more similar to a map of interstate highways with many junctures and redundant routes.

The Internet backbone is maintained by **network service providers** (NSPs) such as AT&T, Qwest, Sprint, and Verizon. NSP equipment and links are tied together by **network access points** (NAPs). For example, data can begin its journey on a Verizon link and, if necessary, cross over to a Sprint link to reach its destination. NSPs supply Internet connections to Internet service providers, such as AT&T, AOL, and Comcast. An **Internet service provider** (ISP) is a company that offers Internet access to individuals, businesses, and smaller ISPs.

The computer that you use to access the Internet is sometimes referred to as a **client computer**. Like a customer who orders food in a restaurant, your client computer orders information and then waits for it to arrive. If you use a computer in a school or corporate network, the network generally provides an Internet connection. From your home computer, you typically connect to the Internet using a device called a **modem**, which sends and receives signals that represent data. The type of modem that you use and the speed at which it transfers data depend on the kind of Internet service you have. When your computer connects to the Internet, it sends data to, and receives data from, an ISP. The ISP, in turn, connects through an NSP to the Internet backbone.

Figure 7-1



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FAQ What are the options for Internet service?

Internet services vary in cost, speed, and reliability. The cost of Internet service ranges from about US$10 per month to US$100 per month. You pay for speed and other conveniences, such as mobile access.

The speed of an Internet connection is measured in bits per second. Technically, bits per second measures capacity, but it is commonly referred to as speed. The slowest connections transmit a mere 56 Kbps (56,000 bits per second), whereas fast connections, called **broadband connections**, blaze away at speeds over 16 Mbps (16 million bits per second). Faster speeds are better, especially if you want to play online games, participate in online teleconferences, or watch online videos.

Some Internet connections are **symmetrical**, which means that the **upstream speed** of data traveling from your computer to the Internet is the same as the **downstream speed** of data traveling from the Internet to your computer. However, most connections are **asymmetrical**, with data traveling faster downstream than upstream. Most people have lots more data coming to their computer than leaving it. Therefore, downstream speed is more important unless you are participating in a project that requires you to transfer lots of large files to other participants.

Once you get accustomed to having Internet service, you’ll be unhappy if you frequently lose your connection. Internet connections that transmit data through cables tend to be more reliable than those that transmit data wirelessly. However, wireless Internet connections can be more convenient if you’re on the go.

Cable Internet service is a means of distributing broadband Internet access over the same infrastructure that offers cable television service. Local and national cable companies—such as Comcast, Cox, and Charter—offer cable Internet service for a monthly subscription. Of all Internet services, cable Internet currently offers the fastest access speeds. Cable Internet service uses a cable modem to transfer data from your computer to your home cable connection and then to the Internet. Consumers usually have the option to install the cable modem themselves or wait for a cable company technician.

DSL (digital subscriber line) is a broadband Internet access technology that runs over standard phone lines. It offers a price-competitive alternative to cable Internet service. DSL is available from many local telephone companies and third-party DSL providers. DSL service can be symmetrical or asymmetrical. If you need lots of upstream speed, a symmetrical DSL connection could be the best choice. Some DSL installations require trained service technicians, whereas others can be handled by consumers. You can contact your telephone company to find out whether DSL is available in your area.

Dial-up Internet service uses a voiceband modem and telephone lines to transport data between your computer and your ISP. Many ISPs—including AT&T, AOL, and EarthLink—offer dial-up Internet access. The service typically costs less than US$10 per month, but access speed is slow. Dial-up connections are not suitable for playing online games, teleconferencing, or watching videos. Even downloading software and essential operating system updates can take hours.

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• What are the options for Internet service? (continued)

Satellite Internet service distributes broadband asymmetric Internet access by broadcasting signals to and from a personal satellite dish. In many rural areas, satellite Internet service is the only alternative to dial-up access. Unfortunately, susceptibility to bad weather makes it less reliable than cable-based services. In addition, the time required for a signal to travel to a satellite and back—called **latency**—makes this type of connection too slow for online gaming.

An alternative wireless technology called **WiMAX** transmits data from your computer to a nearby communications tower, which then links to the Internet. WiMAX is one of the newest technologies for Internet access and is available in fewer locations than other Internet services.

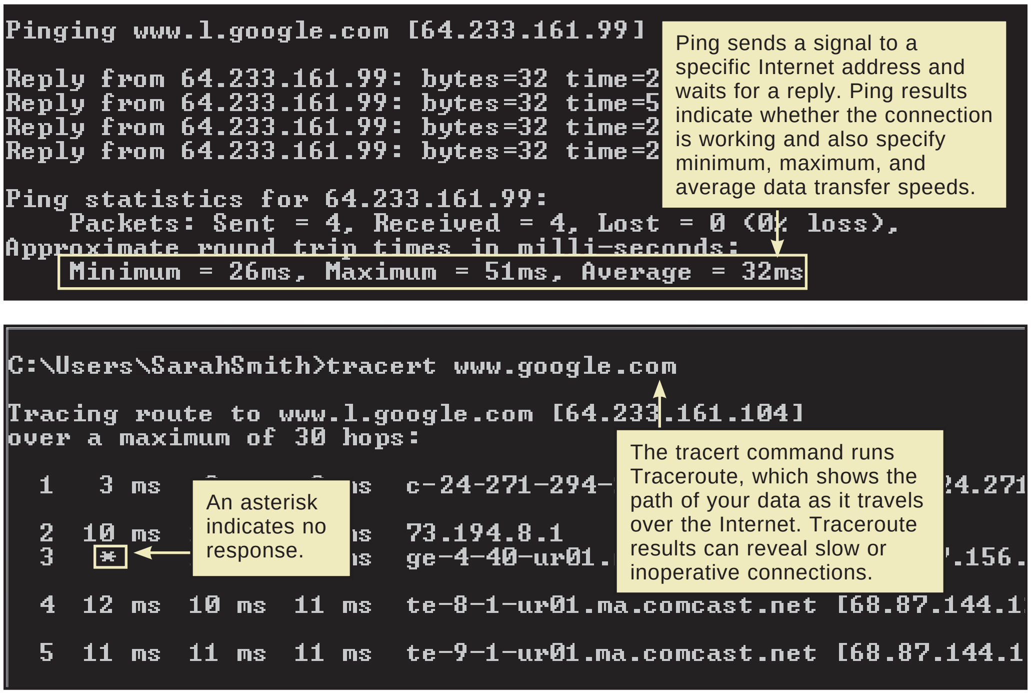
Mobile broadband offers access to the Internet through high-speed cellular technologies. Offered by cell phone providers, mobile broadband is designed for handheld devices, such as PDAs and smartphones, as well as notebook, tablet, and netbook computers. The key feature of this technology is that you can use it on the go. Like a cell phone, your Internet connection is handed off from one communications tower to the next as you travel within the coverage area.

Mobile broadband data transfer rates can be slower, however, than other broadband services like cable and DSL. Connections are sometimes dropped or blocked by buildings, so mobile broadband is one of the least reliable services. Most subscribers use it as a supplement to cable or DSL service, though it can be an expensive addition to monthly cell phone bills.

The real speed of an Internet connection is round trip time (RTT), the time it takes data to travel to its destination and back. Measured in milliseconds (ms), lower numbers indicate faster speeds. You can check the speed of your Internet connection using Web apps or local software, such as Ping and Traceroute. Click the Try It! button in Figure 7-2 to find out how they work.

Try It!

Figure 7-2



```
Pinging www.l.google.com [64.233.161.99]

Reply from 64.233.161.99: bytes=32 time=2
Reply from 64.233.161.99: bytes=32 time=5
Reply from 64.233.161.99: bytes=32 time=2
Reply from 64.233.161.99: bytes=32 time=2

Ping statistics for 64.233.161.99:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 26ms, Maximum = 51ms, Average = 32ms
```

Ping sends a signal to a specific Internet address and waits for a reply. Ping results indicate whether the connection is working and also specify minimum, maximum, and average data transfer speeds.

```
C:\Users\SarahSmith>tracert www.google.com

Tracing route to www.l.google.com [64.233.161.104]
over a maximum of 30 hops:

  1    3 ms              ms  c-24-271-294-                    24.271
  2   10 ms              ms  73.194.8.1
  3    *                 ms  ge-4-40-ur01.                    .156.
  4   12 ms  10 ms  11 ms  te-8-1-ur01.ma.comcast.net [68.87.144.1
  5   11 ms  11 ms  11 ms  te-9-1-ur01.ma.comcast.net [68.87.144.1
```

An asterisk indicates no response.

The tracert command runs Traceroute, which shows the path of your data as it travels over the Internet. Traceroute results can reveal slow or inoperative connections.

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FAQ What is an IP address?

Every device on the Internet has an assigned **IP address** that identifies it just like a street address identifies the location of a house. When your computer is connected to the Internet, it also has an IP address, which is attached to every packet of data you send or receive. IP addresses, such as 204.127.129.1, are divided by periods into four segments called octets.

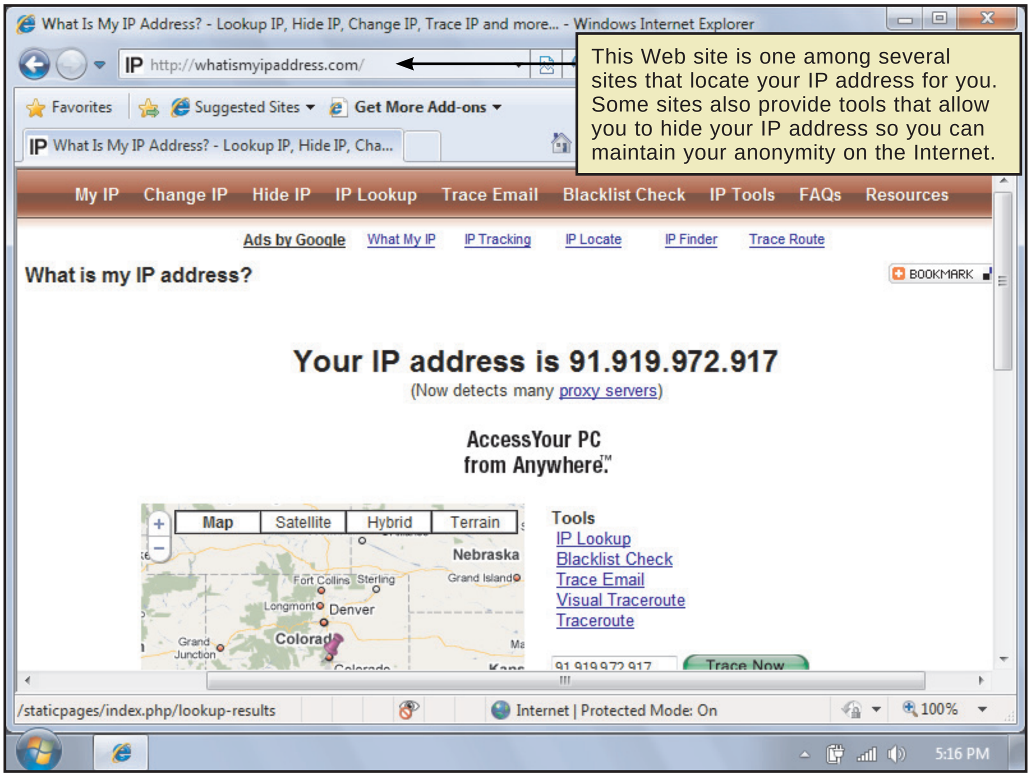
A computer can have a permanently assigned **static IP address** or a temporarily assigned **dynamic IP address**. Typically, ISPs, Web sites, Web hosting services, and e-mail servers that always need to be found at the same address require static IP addresses. Most other Internet users have dynamic IP addresses.

Your ISP assigns your computer an IP address. When you use a dial-up connection, you get a different IP address every time you connect. DSL, satellite, and cable Internet connections are classified as **always-on connections**, meaning that they remain active even when you are not online. With an always-on connection, your IP address can remain the same for days, weeks, or even months.

Through a process called **geolocation**, your IP address indicates the general region of the world where your computer is located. That association can be used to tailor your Internet experience to a location's language, currency, or merchants. It can also be used to filter or block information based on local laws or workplace policies. Theoretically, your IP address can be used to track your Internet activities, so you should not assume that your online activities are anonymous. Click the Try It! button for some hints on how to find your IP address.

Try It!

Figure 7-3



This Web site is one among several sites that locate your IP address for you. Some sites also provide tools that allow you to hide your IP address so you can maintain your anonymity on the Internet.

What is my IP address?

Your IP address is 91.919.972.917

(Now detects many proxy servers)

What Is My IP Address? - Lookup IP, Hide IP, Change IP, Trace IP and more... - Windows Internet Explorer
http://whatismyipaddress.com/
Favorites
Suggested Sites
Get More Add-ons
What Is My IP Address? - Lookup IP, Hide IP, Cha...
My IP
Change IP
Hide IP
IP Lookup
Trace Email
Blacklist Check
IP Tools
FAQs
Resources
Ads by Google
What My IP
IP Tracking
IP Locate
IP Finder
Trace Route
BOOKMARK
AccessYour PC from Anywhere.
Map
Satellite
Hybrid
Terrain
Nebraska
Fort Collins
Sterling
Grand Island
Longmont
Denver
Colorado
Grand Junction
Tools
IP Lookup
Blacklist Check
Trace Email
Visual Traceroute
Traceroute
91.919.972.917
Trace Now
/staticpages/index.php/lookup-results
Internet | Protected Mode: On
100%
5:16 PM

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FAQ How do I avoid online intrusions?

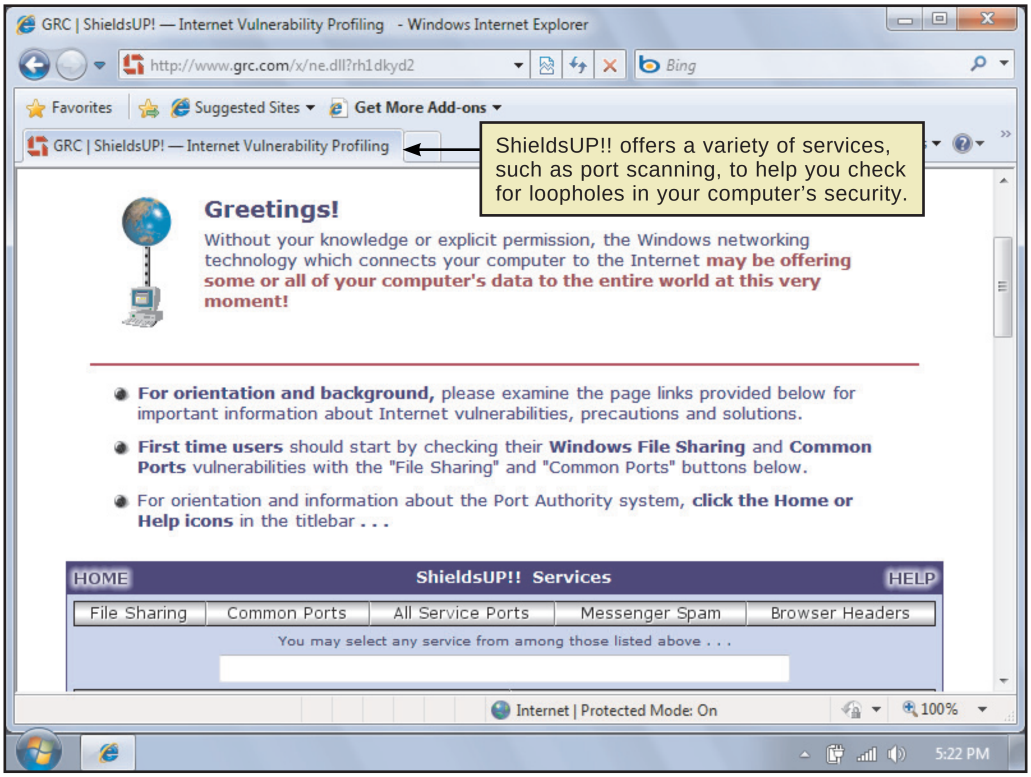
In the context of computers, an **intrusion** is any access to data or programs by hackers, criminals, or other unauthorized persons. As the result of an intrusion, data can be stolen or altered, system configurations can be changed to allow even more intrusions, and software can be surreptitiously installed and operated under the remote control of a hacker.

One of the most common ways of gaining unauthorized access to a network-based computer is by looking for open ports. The term **port** refers to any pathway that can be used to transfer data into or out from a computer. Ports can be physical, as in the case of USB ports, or they can be virtual ports created by software. Hackers look for virtual ports used for transmitting and sharing data over networks. Open ports are like unlocked doors. Hackers are continuously canvassing the Internet and probing ports to find their next victims. **Port scanning software** can examine more than 30,000 computers per minute. The average survival time for an unprotected computer to remain uncompromised on the Internet is only 4 minutes!

You can check your computer for vulnerable open ports using online tools, such as ShieldsUP!!. You can also take steps to avoid intrusions by shutting down your computer when it is not in use, keeping your computer up to date with the latest operating system security patches, using **personal firewall software** to block suspicious incoming transmissions, and using a router (which you'll learn about in the Hardware section). How can you check whether your computer's ports are vulnerable? Tour the ShieldsUP!! test suite by clicking the Try It! button.

Try It!

Figure 7-4


GRC | ShieldsUP! — Internet Vulnerability Profiling - Windows Internet Explorer
http://www.grc.com/x/ne.dll?rh1dkyd2
Bing
Favorites
Suggested Sites
Get More Add-ons
GRC | ShieldsUP! — Internet Vulnerability Profiling
HOME
ShieldsUP!! Services
HELP
File Sharing
Common Ports
All Service Ports
Messenger Spam
Browser Headers
Internet | Protected Mode: On
100%
5:22 PM

ShieldsUP!! offers a variety of services, such as port scanning, to help you check for loopholes in your computer's security.

Greetings!

Without your knowledge or explicit permission, the Windows networking technology which connects your computer to the Internet **may be offering some or all of your computer's data to the entire world at this very moment!**

- **For orientation and background,** please examine the page links provided below for important information about Internet vulnerabilities, precautions and solutions.
- **First time users** should start by checking their **Windows File Sharing** and **Common Ports** vulnerabilities with the "File Sharing" and "Common Ports" buttons below.
- For orientation and information about the Port Authority system, **click the Home or Help icons** in the titlebar . . .

You may select any service from among those listed above . . .

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Hardware

Wired and wireless network devices

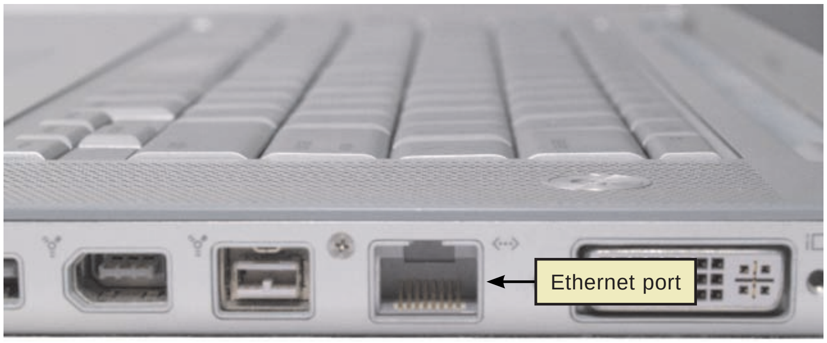
The Internet connects many smaller networks—sometimes referred to as **local area networks**, or LANs—typically owned and operated by businesses, nonprofit organizations, schools, students, and homeowners. These networks are designed to connect several computers, printers, and other devices such as scanners. With a LAN, sharing files and programs is easy. If you've been given permission, you can access folders on other network computers as easily as you access folders on your computer's hard disk. A local area network has one additional important advantage—it can be configured to allow many computers to share a single Internet connection.

Several wired and wireless technologies are available for creating business, home, school, and dorm-room LANs. Most of these technologies can be mixed and matched as needed to form a network. The two most popular LAN technologies are Ethernet and Wi-Fi.

Ethernet is a wired network technology used on LANs as well as on the Internet. The original Ethernet standard, IEEE 802.3, operated at 10 Mbps. **Fast Ethernet** offers 100-Mbps speeds, Gigabit Ethernet races along at 1000 Mbps, and the fastest Ethernet of all operates at 10 Gbps. For home networks, Fast Ethernet offers more than sufficient speed for Internet access, network gaming, and streaming video applications.

Most computers on the market today include an Ethernet port that can easily be used to make a LAN connection. Ethernet connections are fast, inexpensive, reliable, and fairly secure. The major concern with Ethernet is unsightly cables that run between network devices. To locate the Ethernet port on your computer, look for a rectangular jack that resembles an oversized telephone connector.

Figure 7-5



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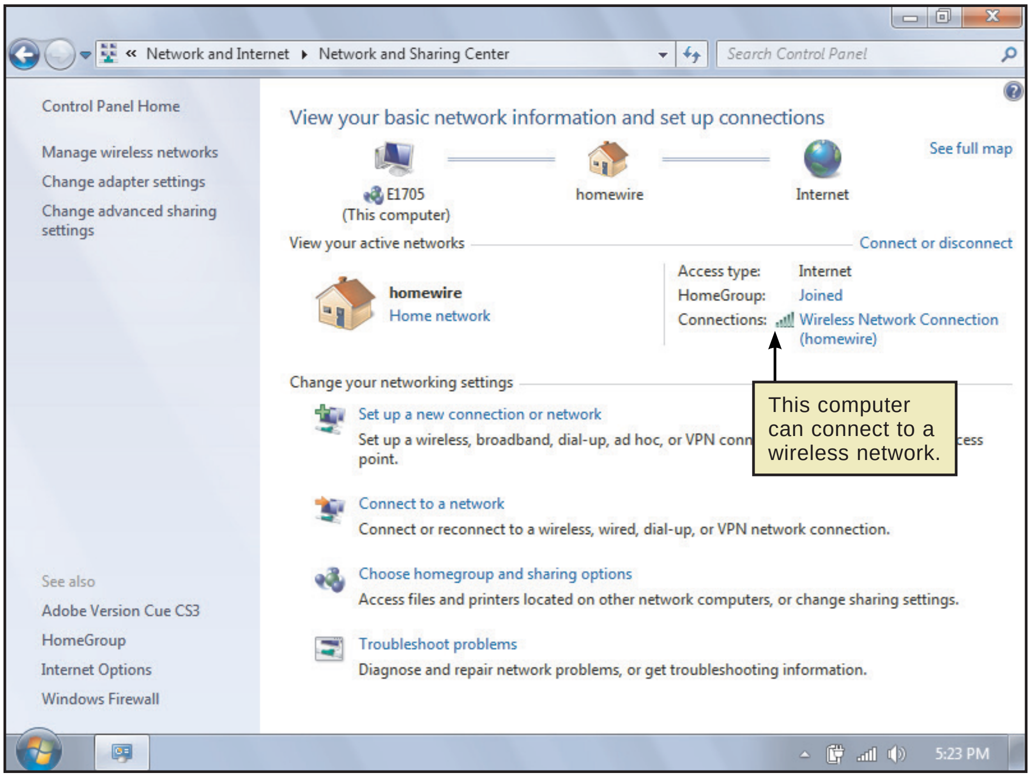
Hardware
(continued)

Wi-Fi refers to a set of wireless networking technologies defined by IEEE 802.11 standards. A Wi-Fi device transmits data as radio waves over 2.4 GHz or 5 GHz frequencies, much like a cordless telephone. Since it was introduced, Wi-Fi rapidly progressed through several generations, which are differentiated by a letter at the end of the IEEE designation. The most recent Wi-Fi generations are 802.11g and 802.11n. When purchasing network devices, make sure they are from compatible Wi-Fi generations.

Most portable computers are equipped with Wi-Fi circuitry. To check your connection or troubleshoot network connection problems, use the Control Panel's Network and Sharing Center.

Figure 7-6


« Network and Internet ▸ Network and Sharing Center
Search Control Panel
Control Panel Home
Manage wireless networks
Change adapter settings
Change advanced sharing settings
See also
Adobe Version Cue CS3
HomeGroup
Internet Options
Windows Firewall
See full map
E1705
(This computer)
homewire
Internet
Connect or disconnect
5:23 PM

View your basic network information and set up connections

View your active networks

homewire
Home network

Access type: Internet
HomeGroup: Joined
Connections: Wireless Network Connection (homewire)

Change your networking settings

Set up a new connection or network
Set up a wireless, broadband, dial-up, ad hoc, or VPN conn ess point.

Connect to a network
Connect or reconnect to a wireless, wired, dial-up, or VPN network connection.

Choose homegroup and sharing options
Access files and printers located on other network computers, or change sharing settings.

Troubleshoot problems
Diagnose and repair network problems, or get troubleshooting information.

This computer can connect to a wireless network.

The main advantage of wireless network devices is mobility. Wi-Fi devices are not tethered to network cables, so battery-operated computers can be easily moved from room to room or even outdoors and still remain connected to the network. With wireless networks, there are no unsightly cables. In addition, power spikes are much less likely to run through cables to damage computers and other network devices. When compared to wired data transport, however, wireless signals tend to travel more slowly and are less secure.

Because wireless network data essentially floats freely through the air, hackers have an easy time intercepting signals. Preventing Wi-Fi signal interception is difficult, but encrypting transmitted data makes it useless to intruders. **Wireless encryption** scrambles the data transmitted between wireless devices and then unscrambles the data only on devices that have a valid encryption key. Make sure your Wi-Fi network is protected by wireless encryption such as WEP (Wired Equivalent Privacy), WPA (Wi-Fi Protected Access), or WPA2.

Hardware (continued)

The centerpiece of most LANs is a device called a **router**. Today's routers are multipurpose devices that act as a central point of connection for computers and other network devices. Routers also ship data from one network to another and help prevent intrusions.

The most popular routers support both wired and wireless devices so that your network can have some wired devices with fast data access and other wireless devices that are easy to move around.

The other key characteristic of a router is its ability to control the flow of data from one network to another—for example, between your local area network and the Internet. A router makes sure that local data stays within the LAN, but ships outgoing e-mail and Web requests to a modem, where they are transmitted to the Internet. By connecting your network's router to a DSL, satellite, or cable Internet modem, all the computers in your network gain access to the Internet.

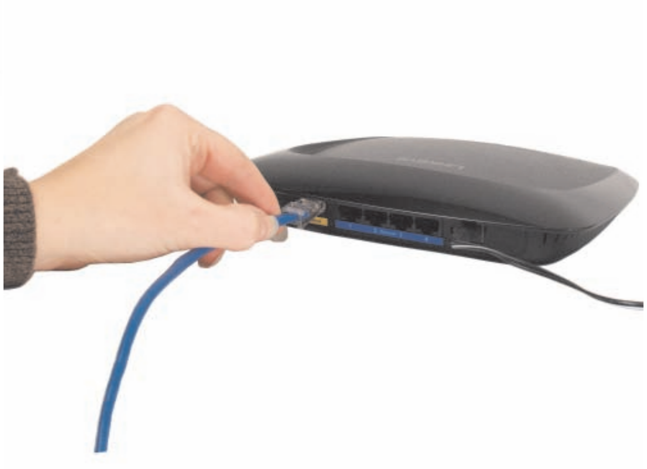
A router is also an important security device. It prevents hackers from reaching your computer with port probes because it assumes the use of the IP address assigned by your ISP. Your computer no longer uses this highly visible address. Instead, your computer receives a **private IP address** from the router. A private IP address can be used within a LAN, but not for Internet data transport. When your computer has a private IP address, it is essentially hidden from hackers.

The security feature of a router is sometimes referred to as **network address translation** (NAT) because the router translates your computer's private IP address into a routable IP address. It is similar to using a post office box as your mailing address. Just as a stalker who finds your mailing address can only reach your post office box, hackers who scan ports at random IP addresses can only reach your router, which contains none of your important data.

A router is such an important security device that many experts recommend that you use one even for a single computer; adding a router between your computer and your Internet modem is an inexpensive yet effective way to foil intrusions. Click the Play It! button to see how easy it is to assemble a network that includes a router.

Play It!

Figure 7-7



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Project

Explore your Internet connection

This chapter introduced you to the Internet and basic concepts associated with it. You were shown the types of Internet service available, some tools that can be used to check your computer's Internet connection speed, and vulnerabilities that can arise from being connected to the Internet. Devices for wired and wireless networks were also discussed.

When you have completed the project, you should be able to:

- Test your Internet connection speed using Ping and Traceroute.
- Locate your IP address in the Traceroute report.
- View Internet connection speeds worldwide.
- Test your computer's ports using the ShieldsUP!! utility.

Requirements: This project requires Microsoft Windows 7, Paint, and browser software, such as Internet Explorer, Netscape, Safari, Chrome, or Firefox. E-mail and word processing software are optional for submitting deliverables electronically.

Deliverables:

1 A screenshot of the Ping report for www.yahoo.com, along with minimum, maximum, and average times labeled and circled

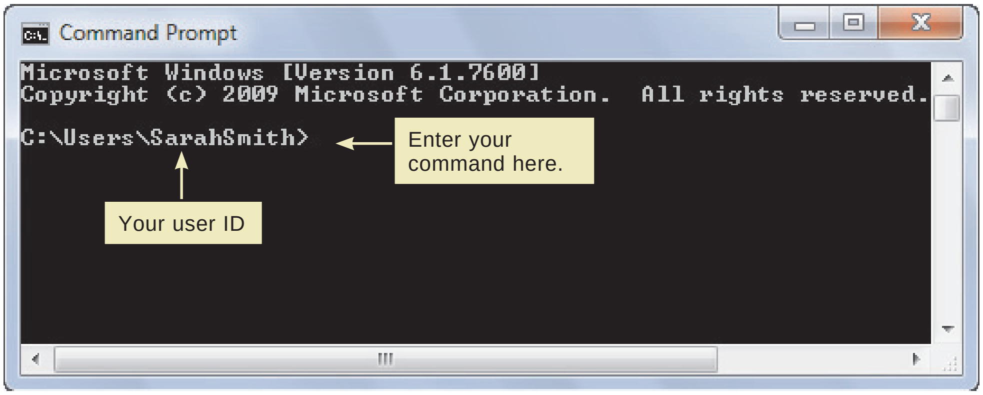
2 A screenshot of the Traceroute report for www.yahoo.com, with your IP address, the total number of hops, and potential problems labeled and circled

3 A document listing the results from the Speedtest Web app

4 A screenshot of an Internet traffic report, plus a comparison of your average response time to that of the rest of your country

5 A screenshot of the ShieldsUP!! report

1. To check your Internet connection speed, you can "ping" an Internet address, such as www.yahoo.com. To do this, enter **Command Prompt** in the Start menu's Search box. A window displaying a command line prompt, such as in the example below, should appear.



```
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\SarahSmith>
```

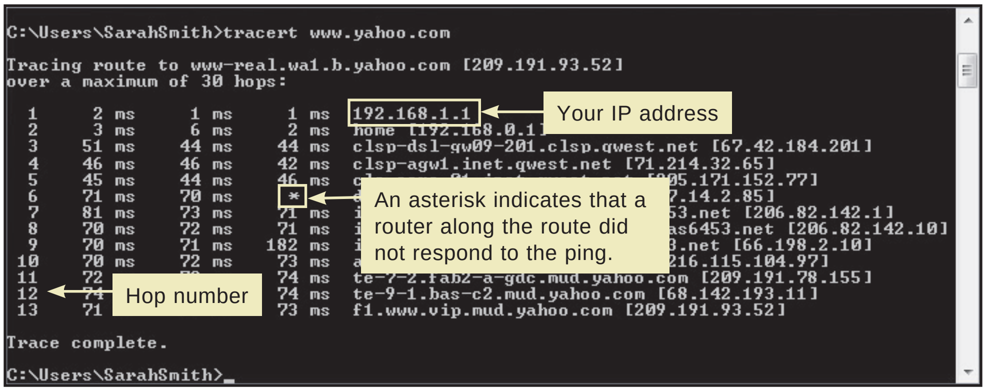
2. Type **ping www.yahoo.com** and then press the Enter key. The Ping utility is not sensitive to uppercase or lowercase letters. If you make a typing error, you can use the Backspace key to correct your mistake as long as you have not pressed the Enter key. If you press the Enter key before you make the correction, you will most likely receive an error message. Simply re-enter **ping www.yahoo.com**.

• Explore your Internet connection (continued)

3. The Ping utility automatically pings www.yahoo.com four times, and then reports the minimum, maximum, and average times for data to make a round trip between your computer and the Yahoo! Web site. Note that average times above 200 ms are not fast enough for online gaming. Ping sometimes displays “request timed out” messages, which mean that the Web site you specified is down or is not accepting pings for security reasons.

   Using the Print Screen key and the Paint program, take a screenshot of the Ping report. Use tools on Paint’s toolbar to circle and label the minimum, maximum, and average times. Save the screenshot as **Project 7A [Your Name]** and close Paint.

4. You can run the Traceroute utility to gather more information about your Internet connection. At the next command prompt, type **tracert www.yahoo.com** and press the Enter key. Take a screenshot of the Traceroute results, which should look similar to the example below.



```
C:\Users\SarahSmith>tracert www.yahoo.com

Tracing route to www-real.wa1.b.yahoo.com [209.191.93.52]
over a maximum of 30 hops:

  1     2 ms     1 ms     1 ms  192.168.1.1
  2     3 ms     6 ms     2 ms  home [192.168.0.1]
  3    51 ms    44 ms    44 ms  clsp-dsl-gw09-201.clsp.qwest.net [67.42.184.201]
  4    46 ms    46 ms    42 ms  clsp-agw1.inet.qwest.net [71.214.32.65]
  5    45 ms    44 ms    46 ms  c                         05.171.152.77]
  6    71 ms    70 ms     *     d                        7.14.2.85]
  7    81 ms    73 ms    71 ms  i                        53.net [206.82.142.1]
  8    70 ms    72 ms    71 ms  i                        as6453.net [206.82.142.10]
  9    70 ms    71 ms   182 ms  i                        3.net [66.198.2.10]
 10    70 ms    72 ms    73 ms  a                        216.115.104.97]
 11    72               74 ms  te-7-2.fab2-a-gdc.mud.yahoo.com [209.191.78.155]
 12    74               74 ms  te-9-1.bas-c2.mud.yahoo.com [68.142.193.11]
 13    71               73 ms  f1.www.vip.mud.yahoo.com [209.191.93.52]

Trace complete.

C:\Users\SarahSmith>_
```

Your IP address
An asterisk indicates that a router along the route did not respond to the ping.
Hop number

5. Analyze the Traceroute results. Circle and label your IP address in the screenshot. Circle and label the total number of hops. For each hop, Traceroute pings three times to test the speed of data travel. An asterisk in the report indicates that one of the routers along the data’s route did not respond. Three asterisks indicate that a ping timed out, revealing a potential problem. Circle any asterisks in your report.

6. Save your screenshot as **Project 7B [Your Name]** and close Paint. Close the command prompt window by typing **exit** at the next command prompt.

7. What your ISP calls “speed” is actually capacity and is measured in Mbps. You can check your connection using a Web app. Open your browser and connect to www.speedtest.net. Click the Begin Test button. When the test is complete, write down your connection’s download speed and upload speed. Also note the times for downloading a typical music file, video clip, and feature-length move. In a sentence or two, describe how this speed compares to the speed advertised by your ISP.

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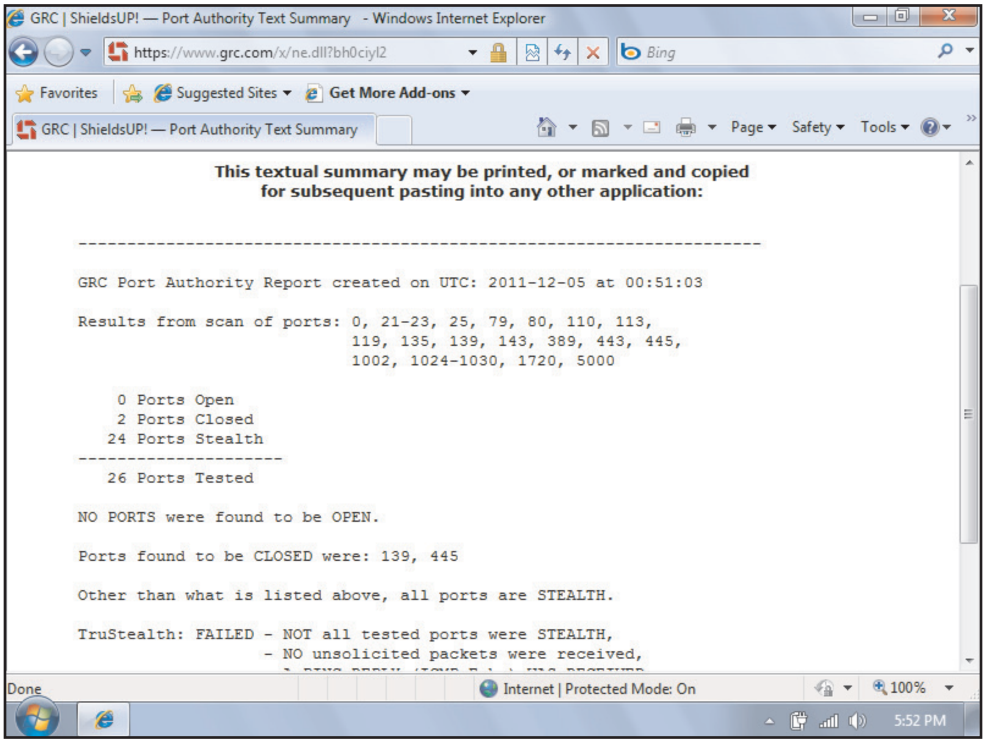
• Explore your Internet connection (continued)

8. If you want to compare your Internet connection speed to that of the rest of the country, you can look at the Internet Traffic Report. Open your browser and connect to www.internettrafficreport.com. Take a screenshot of the report and save it as **Project 7C [Your Name]**. How much slower or faster is your average response time compared to that of the rest of the country?

9. You can run the ShieldsUP!! utility to check your computer for any open ports, which can attract unauthorized access. Open your browser software. In the address bar, type **www.grc.com** and press the Enter key. Click the ShieldsUP!! logo.

10. Scroll through the list of software offerings, look for the Hot Spots heading, and then click ShieldsUP!!. In the middle of the page, ShieldsUP!! displays your IP address. Above the IP address, click the Proceed button.

11. Under ShieldsUP!! Services, click Common Ports. A TruStealth Analysis should be displayed. Scroll down to the bottom of the page and click the Text Summary button. The results should be similar to the example below. Take a screenshot of your summary and save it as **Project 7D [Your Name]**. If you are running the test on your computer, you might consider following the instructions to beef up security.


GRC | ShieldsUP! — Port Authority Text Summary - Windows Internet Explorer
https://www.grc.com/x/ne.dll?bh0ciyl2
Bing
Favorites
Suggested Sites
Get More Add-ons
GRC | ShieldsUP! — Port Authority Text Summary
Page
Safety
Tools
Done
Internet | Protected Mode: On
100%
5:52 PM

This textual summary may be printed, or marked and copied for subsequent pasting into any other application:

```
------------------------------------------------------------------------

GRC Port Authority Report created on UTC: 2011-12-05 at 00:51:03

Results from scan of ports: 0, 21-23, 25, 79, 80, 110, 113,
                            119, 135, 139, 143, 389, 443, 445,
                            1002, 1024-1030, 1720, 5000

    0 Ports Open
    2 Ports Closed
   24 Ports Stealth
---------------------
   26 Ports Tested

NO PORTS were found to be OPEN.

Ports found to be CLOSED were: 139, 445

Other than what is listed above, all ports are STEALTH.

TruStealth: FAILED - NOT all tested ports were STEALTH,
                   - NO unsolicited packets were received,
```

12. Consolidate the deliverables for Project 7 into printed format, a document file, or an e-mail message as specified by your instructor.

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Issue

Do we need anonymous digital cash?

The Internet is increasingly used for **e-commerce** activities, such as shopping online, paying utility bills, and subscribing to various online services. E-commerce typically requires e-payment. Today's consumer usually pays for online transactions using a credit card. But many people wonder whether it is safe to transmit their credit card information over the Internet. Could their credit card numbers be intercepted and then used by crooks?

Although it is possible to intercept data flowing over the Internet, it is not so easy to filter out credit card numbers from the rest of the data. Your credit card number is more likely to be stolen by someone who finds a receipt in your trash or by a dishonest restaurant employee who jots down your card number while processing your dinner payment. Online security at most e-commerce sites further protects your credit card transactions by providing a special connection that encrypts your card number as it travels over the Internet. Although it is fairly safe to use your credit card on the Internet, the process has what many people view as a major disadvantage—it leaves a trail of what you buy and who you pay. Many consumers would prefer to use an anonymous form of payment.

Digital cash is an electronic replacement for cash that can be stored by your PC and spent on the Internet—without leaving a trail to its source. Several companies have unveiled prototypes for digital cash, but none has gained widespread use because some critical issues remain unresolved. For example, can private firms issue digital cash, and can they profit from its use?

Currently, only governments issue cash because controlling the money supply plays an important role in maintaining a stable economy. Is it possible to create digital cash that cannot be stolen or falsified? Obviously, consumers and merchants alike want assurances that the digital cash they receive is authentic. Is it really a good idea to have anonymous transactions? Many honest consumers think so, but so do many criminals. Consumers would enjoy much more privacy with regard to their purchases, but governments would not be able to keep close tabs on taxable income.

What do you think?

1. Have you ever felt uncomfortable providing your credit card number at an e-commerce site? ○ Yes ○ No ○ Not sure

2. Do you think that most people believe that using a credit card in a restaurant is safer than using a credit card on the Internet? ○ Yes ○ No ○ Not sure

3. Do you think that anonymous digital cash is a good idea? ○ Yes ○ No ○ Not sure

Save It!

QuickCheck A

1. In addition to acting as a central point of connection for computers and other network devices, a(n) ☐ is also an important security device.

2. As an alternative to mobile Internet access, which uses cell phone towers, another wireless technology called ☐ transmits data from your computer to a nearby communications tower, which then links to the Internet.

3. Cable, DSL, and satellite Internet connections are classified as ☐ connections, which remain active even when you're not online.

4. A dial-up connection uses a(n) ☐ IP address.

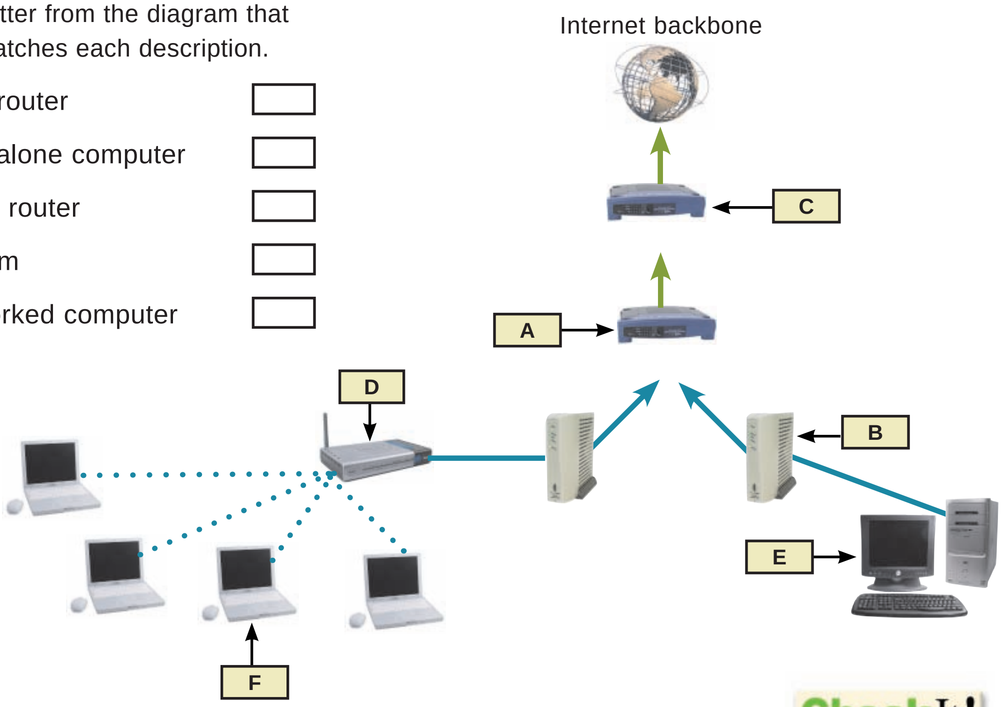
5. True or false? Most Internet connections are symmetrical. ☐

CheckIt!

QuickCheck B

Fill in the letter from the diagram that correctly matches each description.

1. An ISP router ☐
2. A standalone computer ☐
3. An NSP router ☐
4. A modem ☐
5. A networked computer ☐



CheckIt!

GetIt? While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 7.

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CHAPTER 8

Browsing and Searching the Web

What's Inside?

The Web is the most precious jewel in the crown of the Internet. You've seen references to it in magazines and on TV. Web addresses, such as www.nationalgeographic.com, direct you to Web sites where you can find information, order products, interact with other people, and more! Chapter 8 highlights the Web's key features and provides tips for surfing the Web like a pro.

- **FAQs:**

  - What's a Web page? 111
  - What's a URL? 112
  - How does a browser work? 113
  - How do I use a search engine? 114
  - Can I save text and graphics that I find on the Web? 115
  - How do I create my own Web pages? 116
  - How do I access Web apps? 117
- **Hardware:** Mobile Internet access devices 118
- **Project:** Explore the Web 121
- **Issue:** Is it filtering or censorship? 124
- **QuickChecks** 125

What's on the CD?

In Chapter 8, you'll find out how to efficiently use a Web browser and a search engine, the two required software tools in the Web surfer's toolkit. You'll also learn how to incorporate the information that you find on the Web in your own documents and Web pages.

- Discover what goes on behind the scenes of a Web page 111
- Find out how to use a Web browser's most crucial security features 113
- Learn how to search the Web using Google 114
- See how easily you can save a copy of a Web page 115
- Discover how to create your own Web pages 116
- Tour Google Docs 117

FAQ What's a Web page?

A **Web page** is the product or output of one or more Web-based files, which are displayed on your computer in a format similar to a page in a book. Unlike book pages, however, Web pages can dynamically incorporate pictures, videos, sounds, and interactive elements. Millions of Web pages are interlinked and available on an Internet service called the **Web** (short for the "World Wide Web").

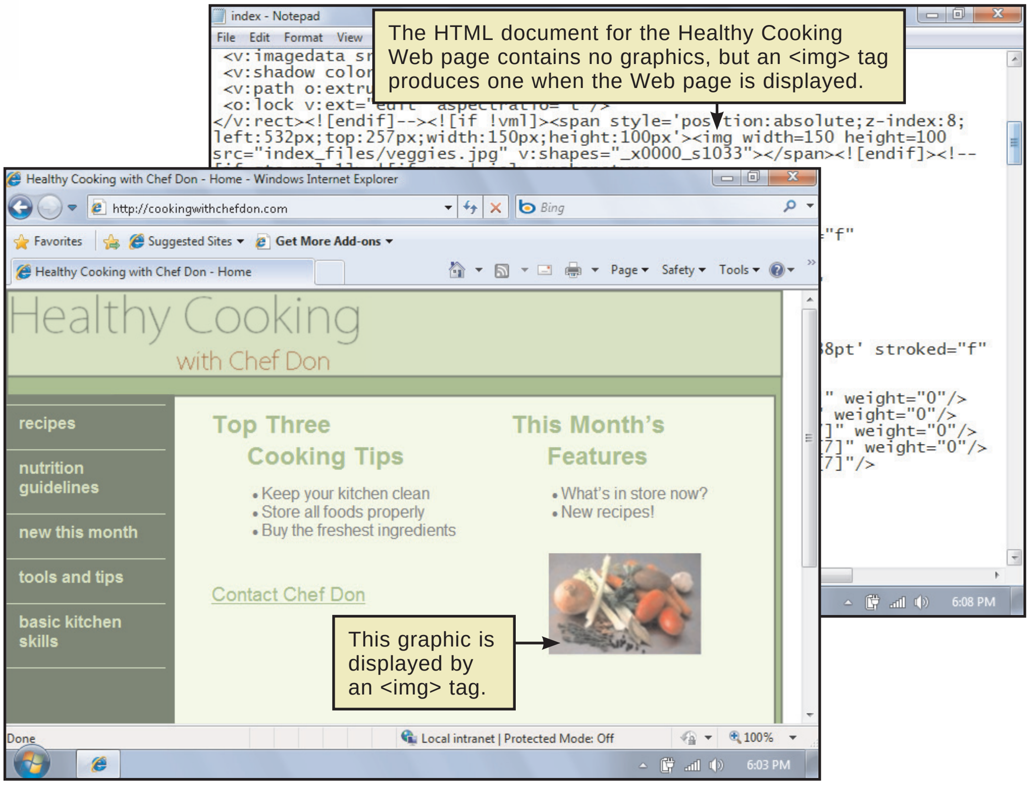
The computers that store Web pages are known as **Web servers**. Each Web server hosts one or more **Web sites** that contain information about a specific topic, company, organization, person, event, or place. The main page for a Web site is sometimes referred to as a **home page**.

Clickable links between Web pages, sometimes called **hypertext links**, allow you to follow a thread of information from one Web page to another within a site or across to other sites. **Text links** usually appear as blue or green underlined words. Some Web pages also have **graphics links** that appear as pictures, rather than as underlined text. When you point to a text or graphics link, the arrow-shaped pointer changes to a hand-shaped **link pointer**. By clicking a link, you are requesting the Web page indicated by the link. To fulfill your request, a Web server sends data for the Web page to your PC's memory. Your PC can then display the Web page on the screen.

Most Web pages are stored as HTML documents. **HTML** (Hypertext Markup Language) is a set of instructions that can be embedded into a document to produce specific effects, such as bold text, colored backgrounds, and underlined links. Embedded instructions are called **HTML tags** and they are encased in angle brackets. For example, when creating a title in an HTML document, you can specify that it will be displayed in bold by using the <b> HTML tag. Click the Try It! button to find out more about HTML documents and how they are displayed as Web pages.

Try It!

Figure 8-1



index - Notepad
File Edit Format View
Healthy Cooking with Chef Don - Home - Windows Internet Explorer
http://cookingwithchefdon.com
Bing
Favorites
Suggested Sites
Get More Add-ons
Healthy Cooking with Chef Don - Home
Page
Safety
Tools
Healthy Cooking
with Chef Don
recipes
nutrition guidelines
new this month
tools and tips
basic kitchen skills
Top Three Cooking Tips
Keep your kitchen clean
Store all foods properly
Buy the freshest ingredients
This Month's Features
What's in store now?
New recipes!
Contact Chef Don
Done
Local intranet | Protected Mode: Off
100%
6:03 PM
6:08 PM

```
</v:rect><![endif]--><![if !vml]><span style='pos tion:absolute;z-index:8;
left:532px;top:257px;width:150px;height:100px'><img width=150 height=100
src="index_files/veggies.jpg" v:shapes="_x0000_s1033"></span><![endif]><!--
```

The HTML document for the Healthy Cooking Web page contains no graphics, but an <img> tag produces one when the Web page is displayed.

This graphic is displayed by an <img> tag.

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FAQ What's a URL?

A **URL** (uniform resource locator) is essentially a Web page address—it specifies the Web server that stores the page, the folder (or folders) that hold the page, and the name of the page. If you are not using a link to jump to a Web page, you can enter its URL manually.

Most URLs begin with http://. The acronym **HTTP** stands for Hypertext Transfer Protocol, a communications standard used by Web servers for transmitting Web pages over the Internet. The term **communications protocol** (or simply "protocol") refers to a set of standards and rules that help network devices and other communications equipment transmit data in an efficient and orderly way. Protocols govern the way data is packaged, codified, and transported.

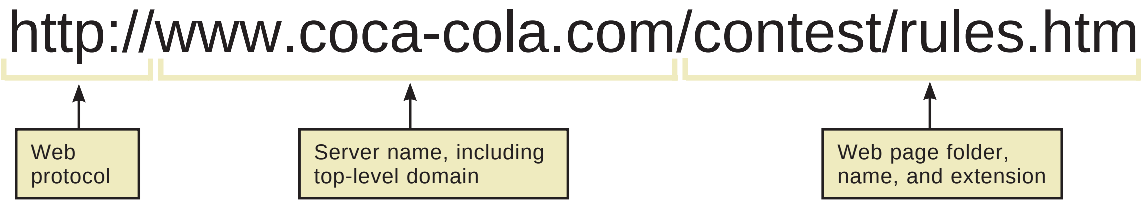
For security, some Web sites encrypt transmissions using Secure HTTP, Secure Sockets Layer (SSL), or Transport Layer Security (TLS). The URL for a secure site begins with https://.

The next part of the URL is the Web server's name, which usually begins with www and includes the name of a company, organization, or person. Periods separate the parts of a server name, as in http://www.coca-cola.com. The last part of the server name indicates a Web server category or **top-level domain**, such as .com for commercial businesses, .org for professional and nonprofit organizations, .gov for the U.S. government, and .edu for educational institutions. A top-level domain might also indicate a country, such as .ca for Canada or .uk for the United Kingdom. You can generally connect to a Web server by simply entering the server name without http://. Entering www.coca-cola.com should connect you to Coca-Cola's home page.

In addition to the home page, a Web server typically stores hundreds or thousands of other Web pages identified in the last part of the URL by a folder name, file name, and file extension, such as /contest/rules.htm. Unlike Windows path names, which use backslashes, URLs use forward slashes to separate the folder name from other parts of the path. Most Web pages have an .html or .htm extension because they are stored in HTML format.

When you enter a URL, make sure you type it exactly as written. If you are guessing the URL of a Web server, use all lowercase letters. URLs don't contain any spaces, so never add a space before or after a period or a slash.

Figure 8-2


http://www.coca-cola.com/contest/rules.htm
Web protocol
Server name, including top-level domain
Web page folder, name, and extension

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FAQ How does a browser work?

A **Web browser** (or "browser" for short) is the software that displays Web pages on your computer screen by interpreting HTML tags embedded in the files used to create Web pages. Your browser understands, for example, that when it encounters the HTML tag in the text of a file, it should underline text until it reaches a tag. A browser also handles links between Web pages. When you click an underlined link, your browser uses the link's URL to request the specified page. Today's most popular browsers are Mozilla Firefox, Google Chrome, and Microsoft Internet Explorer.

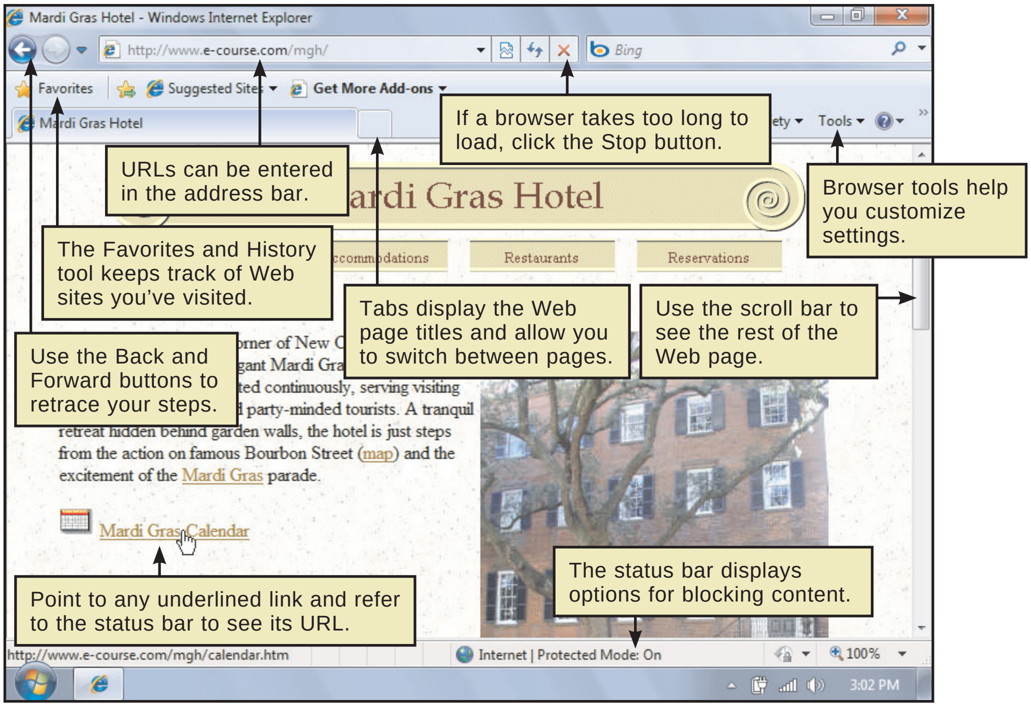
Special computer programs called **plug-ins** extend the variety of files and media that your browser can display on a Web page. For example, certain types of video and sound files might require plug-ins. Adobe Flash Player, Adobe Reader, and QuickTime are examples of popular plug-ins. If a Web page requires a plug-in that your browser doesn't have, you typically see a message indicating which plug-in is needed and the site from which it can be downloaded.

Sometimes, your browser interacts with a Web server to create a cookie. A **cookie** is a message that contains information to help a Web server identify you and, perhaps, customize the information it presents. When you access a Web site that uses cookies, the Web server generates a unique user number for you and combines it with information that typically tracks the pages you view within the Web site. This information is encapsulated as a cookie and sent to your browser, which stores the cookie on your PC. Whenever you access the Web site, your browser sends the cookie back to the Web server for its use.

Your browser can also protect you from annoying and potentially dangerous pop-up ads. A **pop-up ad** is a pervasive type of advertising that appears as a floating graphic or as a new window. If your browser's information bar indicates that a pop-up ad has been blocked, you can click the information bar to allow pop-ups from the site or block them permanently. Click Try It! to tour a browser and learn how to use its most crucial security features.

Try It!

Figure 8-3



If a browser takes too long to load, click the Stop button.

URLs can be entered in the address bar.

Browser tools help you customize settings.

The Favorites and History tool keeps track of Web sites you've visited.

Tabs display the Web page titles and allow you to switch between pages.

Use the scroll bar to see the rest of the Web page.

Use the Back and Forward buttons to retrace your steps.

Point to any underlined link and refer to the status bar to see its URL.

The status bar displays options for blocking content.

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FAQ How do I use a search engine?

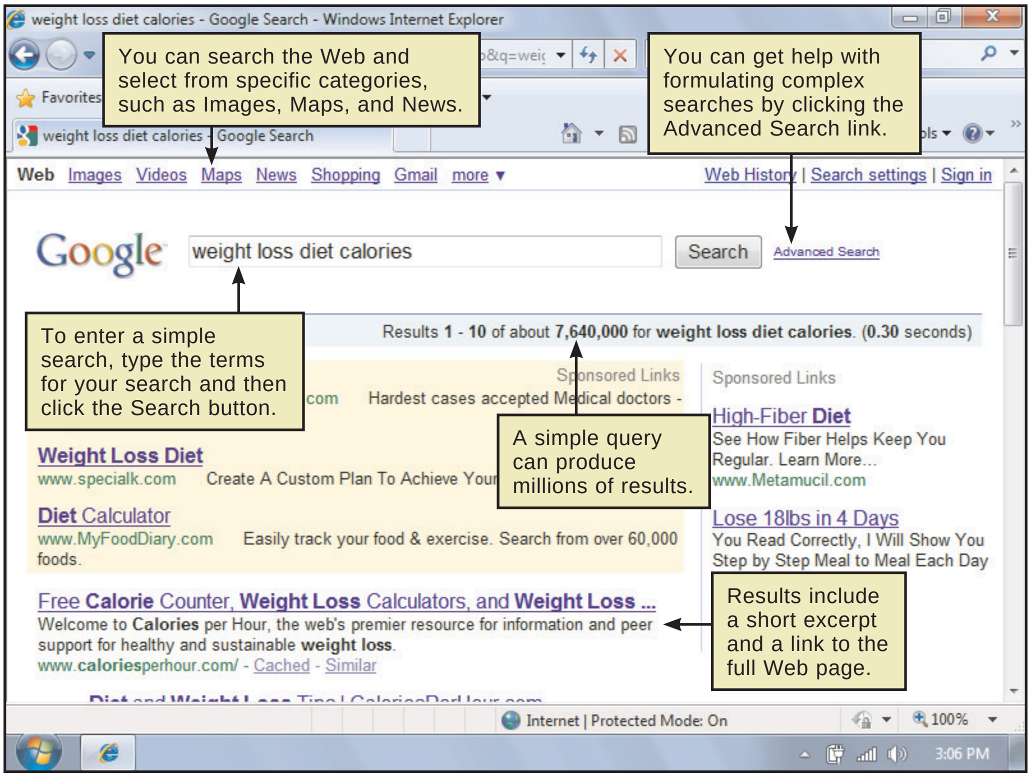
Just as a librarian catalogs books, a **search engine** catalogs Web pages to make it easier to find information. Popular search engines, such as Google, Bing, and Yahoo!, help you sift through the millions of Web pages on the Internet. Like any other Web site, a search engine has a URL. To search with Google, for example, you would use your browser to connect to www.google.com. Once you've connected to a search engine, you enter words and phrases that describe the kind of information you want to find. Google searches through its database and returns a list of links to all of the pages that match your search criteria.

Most search engines can handle both simple and complex searches. For a simple search, you just enter a topic and, perhaps, a few synonyms. To find information about losing weight, for example, you might enter "weight loss diet calories." A search engine responds by showing you a list of results or "hits" for Web pages that contain information on one or all of these topics. The list includes a short summary of each page and an underlined link that you can use to jump directly to it.

With a simple search, a search engine often returns a huge list that might contain more than 100,000 hits. To get a smaller, more targeted list, you can use more sophisticated search techniques. For example, adding words to your search criteria can help focus a search and produce fewer, but more targeted results. Because each search engine provides a slightly different set of advanced search tools, you should consult your search engine's online Help for details on composing advanced searches. Click the Try It! button to find out more about using search engines.

Try It!

Figure 8-4


weight loss diet calories - Google Search - Windows Internet Explorer
Favorites
weight loss diet calories - Google Search
Web Images Videos Maps News Shopping Gmail more ▾
Web History | Search settings | Sign in
Google
weight loss diet calories
Search
Advanced Search
Sponsored Links
Sponsored Links
Internet | Protected Mode: On
100%
3:06 PM

You can search the Web and select from specific categories, such as Images, Maps, and News.

You can get help with formulating complex searches by clicking the Advanced Search link.

To enter a simple search, type the terms for your search and then click the Search button.

A simple query can produce millions of results.

Results include a short excerpt and a link to the full Web page.

Results **1** - **10** of about **7,640,000** for **weight loss diet calories**. (**0.30** seconds)

com Hardest cases accepted Medical doctors -

Weight Loss Diet
www.specialk.com Create A Custom Plan To Achieve Your

Diet Calculator
www.MyFoodDiary.com Easily track your food & exercise. Search from over 60,000 foods.

Free **Calorie** Counter, **Weight Loss** Calculators, and **Weight Loss** ...
Welcome to **Calories** per Hour, the web's premier resource for information and peer support for healthy and sustainable **weight loss**.
www.**calories**perhour.com/ - Cached - Similar

High-Fiber **Diet**
See How Fiber Helps Keep You Regular. Learn More...
www.Metamucil.com

Lose 18lbs in 4 Days
You Read Correctly, I Will Show You Step by Step Meal to Meal Each Day

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FAQ Can I save text and graphics that I find on the Web?

If you come across an interesting article or graphic on the Web, you might want to print it or save it on your PC. To print a Web page, use your browser's Print button or the Print option on the File menu. Before printing, you might want to use the Page Setup option on the File menu to ensure that the Web page URL appears on each sheet of the printout. Instead of printing, you can save a copy of an entire Web page, or just save selected paragraphs. You can also save copies of Web page graphics, including photos and borders.

When using material from the Web, make sure that you respect the author's intellectual property rights. Assume that everything you see on the Web is copyrighted. If you would like to use a graphic that you've downloaded, you should obtain permission first by e-mailing the copyright holder. Look for an e-mail address at the bottom of the Web page that contains the graphic, or check the main page of the site.

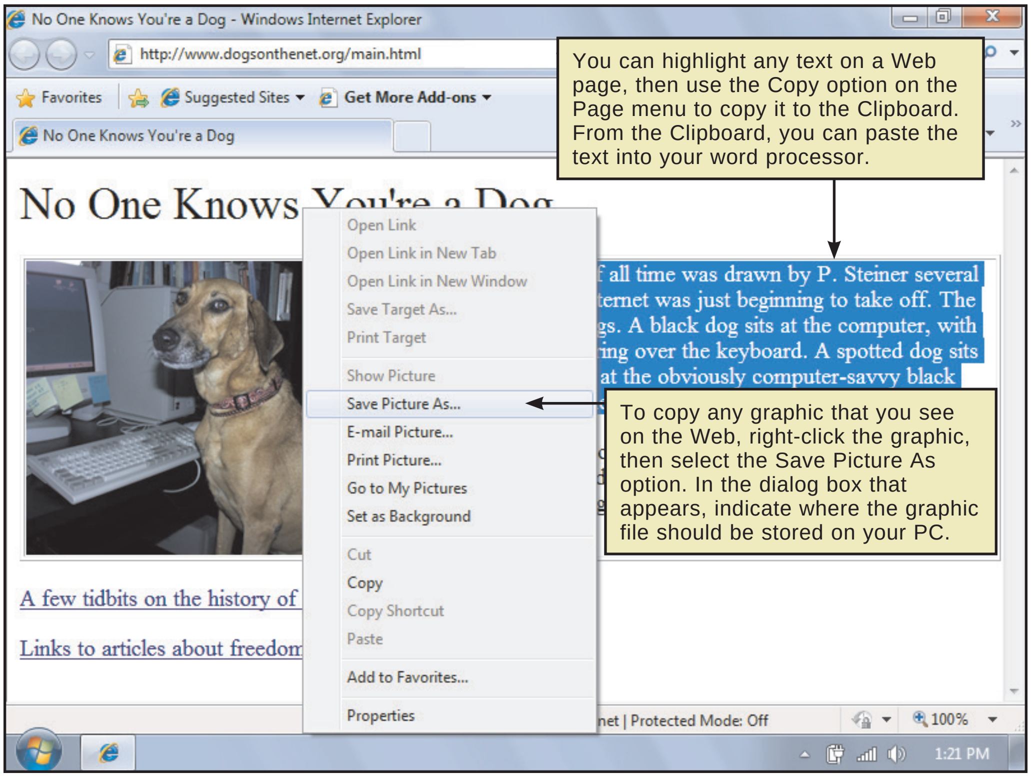
When you incorporate Web page text excerpts into your documents, you must include a citation that follows a standard style, such as MLA or APA. The citation should contain the author's name, the title of the Web page, the title of the site, the date of publication, the date when you accessed the page, and the URL for the page. Note the following example of a citation using the MLA style:

Canine, Claire. "No One Knows You're a Dog." Dogs on the Net. 2009. 11 Nov. 2011 <http://www.dogsonthenet.org/main.html>.

Click the Try It! button to find out how to save a copy of text and graphics that you find on Web pages.

Try It!

Figure 8-5


No One Knows You're a Dog - Windows Internet Explorer
http://www.dogsonthenet.org/main.html
Favorites
Suggested Sites
Get More Add-ons
No One Knows You're a Dog
No One Knows You're a Dog
Open Link
Open Link in New Tab
Open Link in New Window
Save Target As...
Print Target
Show Picture
Save Picture As...
E-mail Picture...
Print Picture...
Go to My Pictures
Set as Background
Cut
Copy
Copy Shortcut
Paste
Add to Favorites...
Properties
f all time was drawn by P. Steiner several
ternet was just beginning to take off. The
gs. A black dog sits at the computer, with
ing over the keyboard. A spotted dog sits
at the obviously computer-savvy black
A few tidbits on the history of
Links to articles about freedom
net | Protected Mode: Off
100%
1:21 PM

You can highlight any text on a Web page, then use the Copy option on the Page menu to copy it to the Clipboard. From the Clipboard, you can paste the text into your word processor.

To copy any graphic that you see on the Web, right-click the graphic, then select the Save Picture As option. In the dialog box that appears, indicate where the graphic file should be stored on your PC.

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FAQ How do I create my own Web pages?

You can create HTML documents for Web pages using Notepad and hand coding the HTML tags, but there are easier ways, such as selecting HTML when you save a file, accessing online Web authoring tools, or using Web authoring software.

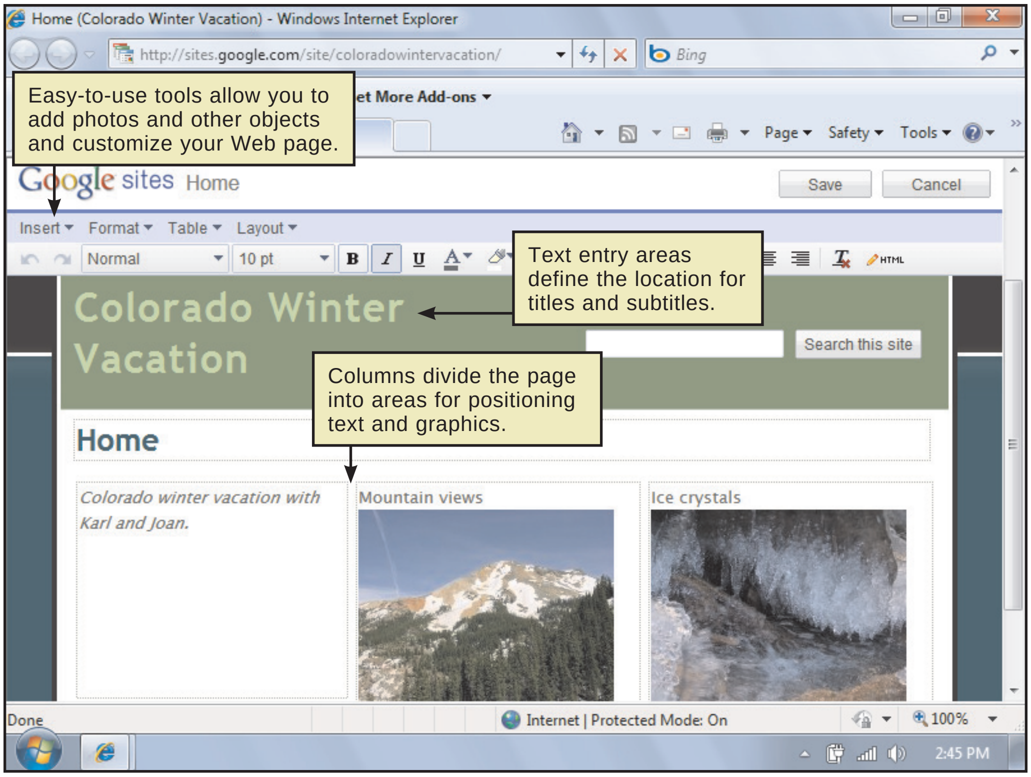
Many applications offer a Save As option that produces an HTML document from a standard document, spreadsheet, presentation, or other text-based file. For example, you can work with Microsoft Word to create a standard DOCX file and then use Word's Save As Web Page option to convert the document into HTML format.

A second option for creating Web pages is a special category of software, referred to as Web authoring software or HTML editors, which provides tools specifically designed to enter and format Web page text, graphics, and links. Popular Web authoring products include Adobe Dreamweaver and open source KompoZer.

A third option for Web page authors is to use a set of online Web page authoring tools. These template-like tools are provided by some ISPs and social networking sites that host Web pages for individuals and businesses. You might have used such tools when creating a Facebook page. Working with these tools is quite simple—you type, select, drag, and drop elements onto a Web page. Step through the process by clicking the Try It! button in Figure 8-6.

Try It!

Figure 8-6


Home (Colorado Winter Vacation) - Windows Internet Explorer
http://sites.google.com/site/coloradowintervacation/
Bing
et More Add-ons
Page
Safety
Tools
Google sites Home
Save
Cancel
Insert
Format
Table
Layout
Normal
10 pt
HTML
Colorado Winter Vacation
Search this site
Home
Colorado winter vacation with Karl and Joan.
Mountain views
Ice crystals
Done
Internet | Protected Mode: On
100%
2:45 PM

Easy-to-use tools allow you to add photos and other objects and customize your Web page.

Text entry areas define the location for titles and subtitles.

Columns divide the page into areas for positioning text and graphics.

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FAQ How do I access Web apps?

A Web app is software that is accessed with a Web browser. Instead of running locally, much of the program code for the software runs on a remote computer connected to the Internet or another computer network. The concept of using software supplied over the Internet from a remote server is sometimes referred to as **cloud computing**.

Web apps are available for many of the same applications that run locally, such as e-mail, photo sharing, project management, maps, and games. In addition, Google, Microsoft, Zoho, and other software vendors offer popular spreadsheet and word-processing Web apps that allow participants in multiple locations to collaborate on projects.

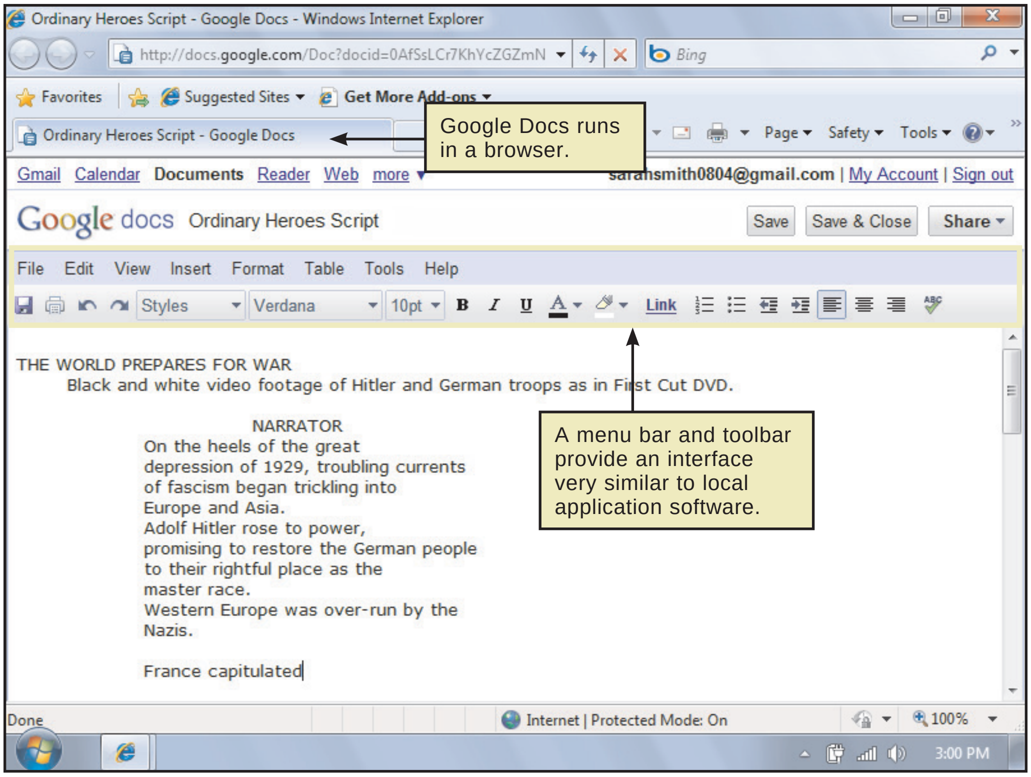
One of the biggest advantages of Web apps is that they can be accessed from any computer with a Web connection. However, Web apps and corresponding data files become temporarily inaccessible if you lose your Internet connection or the Web app server goes down.

Some Web apps are free, whereas others require a one-time registration fee or ongoing monthly usage fees. Even free Web apps usually require users to register by supplying a bit of personal information, choosing a user ID, and selecting a password. Before registering, however, read the terms of use and privacy policy. Find out if you'll be subjected to advertising, if your personal information can be disclosed to third parties, and if anyone else can access data files that you store on the provider's site.

Google Docs is one of the most popular Web apps because it is free and offers easy-to-use word processor, spreadsheet, and presentation applications. Click the Try It! button for a tour of Google Docs.

Try It!

Figure 8-7


Ordinary Heroes Script - Google Docs - Windows Internet Explorer
http://docs.google.com/Doc?docid=0AfSsLCr7KhYcZGZmN
Bing
Favorites
Suggested Sites
Get More Add-ons
Ordinary Heroes Script - Google Docs
Page
Safety
Tools
Gmail
Calendar
Documents
Reader
Web
more
sarahsmith0804@gmail.com | My Account | Sign out
Google docs
Ordinary Heroes Script
Save
Save & Close
Share
File
Edit
View
Insert
Format
Table
Tools
Help
Styles
Verdana
10pt
B
I
U
A
Link
Done
Internet | Protected Mode: On
100%
3:00 PM

THE WORLD PREPARES FOR WAR
Black and white video footage of Hitler and German troops as in First Cut DVD.

NARRATOR
On the heels of the great
depression of 1929, troubling currents
of fascism began trickling into
Europe and Asia.
Adolf Hitler rose to power,
promising to restore the German people
to their rightful place as the
master race.
Western Europe was over-run by the
Nazis.

France capitulated

Google Docs runs in a browser.

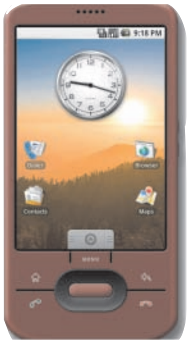
A menu bar and toolbar provide an interface very similar to local application software.

Hardware

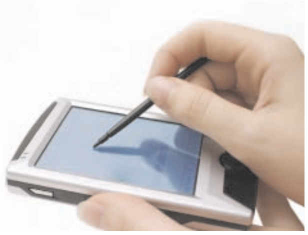
Mobile Internet access devices

It's great to browse the Web on your desktop or notebook computer, but you can add another dimension of convenience by accessing the Internet from a mobile device. Mobile devices, calling plans, and data plans are offered by mobile phone service providers, such as Sprint, Verizon, T-Mobile, and AT&T.

Figure 8-8



Smartphone



PDA

Notebook computer with broadband card

Mobile Internet access offers a continuous Internet connection as you are walking or riding in a bus, car, train, or plane. It is similar in concept to cell phone service that allows you to move freely within a coverage area as your call is seamlessly handed off from one tower to the next. Mobile Internet access is available for mobile phones, PDAs, and portable computers.

A mobile phone that can connect to the Internet is sometimes referred to as a **smartphone**. Smartphones are also characterized by e-mail capability, personal organizers for contacts and schedules, color screens, and built-in cameras. Smartphones are usually purchased as part of a service contract from a mobile phone service provider. A basic service contract typically includes voice calling, but Internet access might involve extra fees. Internet access is usually available only within a service provider's digital coverage area. When you're outside of that area, you can make voice calls, but your data services do not operate or operate at a very slow pace.

A **PDA** (personal digital assistant) is a handheld device that features a touch screen and includes a fairly sophisticated personal organizer, a memory card slot for data storage, and the ability to synchronize data with a personal computer. Although originally designed for data-centric applications, most new PDAs can connect to cell services and Wi-Fi networks for voice calls and Internet access. You can use a PDA on a mobile phone network by subscribing to a service plan with a mobile phone service provider. As with a smartphone, a basic calling plan often needs to be supplemented by a data package.

PDAs and smartphones have rather small screens. If you are unwilling to accept the compromises required for viewing e-mail and Web sites on a handheld device, you can use your notebook, tablet, or netbook computer as a mobile device. A **broadband PC card** is a digital circuit board and transmitter that plugs into a notebook computer and establishes a connection with a mobile phone service provider. You can access e-mail, Web sites, and other Internet services just as you would through any wireless network. A monthly data service plan is required from the mobile service provider that supplies your broadband card.

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Hardware
(continued)

Mobile devices are controlled by an operating system. Much like the operating systems of full-size computers, mobile operating systems set the standard for the interface used by all the device's applications. Most offer graphical interfaces but are somewhat simpler than those that control desktop and portable computers. Mobile operating systems include special routines for networking over cellular services and many also offer Wi-Fi capabilities.

Mobile operating systems also have unique routines for data entry to accommodate a variety of phones, ranging from those that are equipped only with a numeric key pad to sophisticated phones with voice-activated commands and gesture-based touch screens. Mobile operating systems are preinstalled on phones and PDAs, and are not typically altered after the device is purchased.

Phones with the same mobile operating system tend to have similar features and interfaces. So if you loved your old Nokia phone with its Symbian operating system, you'll feel right at home with a new Motorola phone. Five operating systems dominate the realm of handheld computers: Palm webOS, Symbian OS, Windows Mobile OS, iPhone OS, and Android OS shown in Figure 8-9.

Palm webOS is currently used for many popular Palm brand PDAs and smartphones.

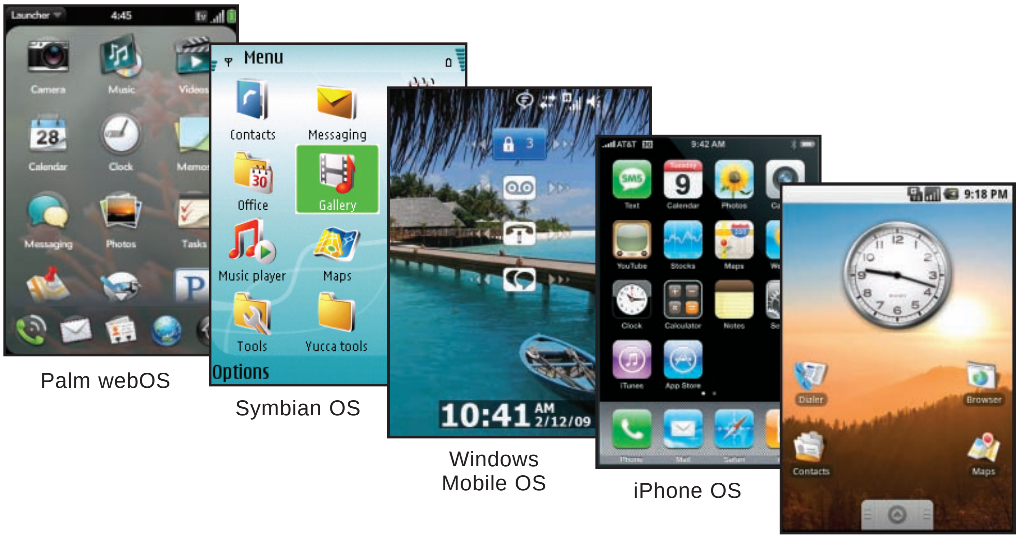
Symbian OS is another popular handheld operating system used with Nokia, BenQ, LG, Motorola, and Ericsson smartphones.

Windows Mobile OS is a cousin to Windows 7 with interface features similar to those found on the Windows desktop. Windows Mobile OS is the operating system for a variety of Pocket PCs, phone-enabled PDAs, and smartphones.

iPhone OS is a version of Mac OS X adapted for the iPhone's ARM processor and optimized for touch screen communications applications. It pioneered routines that manage touch screen gesture inputs. The iPhone OS is an open platform, which means that programs, called iPhone apps, can be created by third-party programmers.

Android OS is an open source operating system distributed by Google. As with iPhones, Android phone owners can download and install third-party apps. T-Mobile, Motorola, and Samsung branded phones are the primary Android products.

Figure 8-9


Launcher
4:45
Camera
Music
Videos
Calendar
Clock
Memos
Messaging
Photos
Tasks
Menu
Contacts
Messaging
Office
Gallery
Music player
Maps
Tools
Yucca tools
Options
10:41 AM 2/12/09
AT&T
9:42 AM
Text
Calendar
Photos
YouTube
Stocks
Maps
Clock
Calculator
Notes
iTunes
App Store
Phone
Mail
Safari
9:18 PM
Dialer
Browser
Contacts
Maps

Palm webOS

Symbian OS

Windows Mobile OS

iPhone OS

Android OS

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Hardware
(continued)

The prospect of surfing the Web from a mobile device is exciting, but the experience can be constrained by small screens, limited memory capacity, and slow data transfer rates. For example, an average-sized 120-kilobyte Web page takes 18 seconds to download if your mobile service uses a GPRS network, 6 seconds over an EDGE network, and just under a second with cutting-edge mobile broadband technologies such as EV-DO.

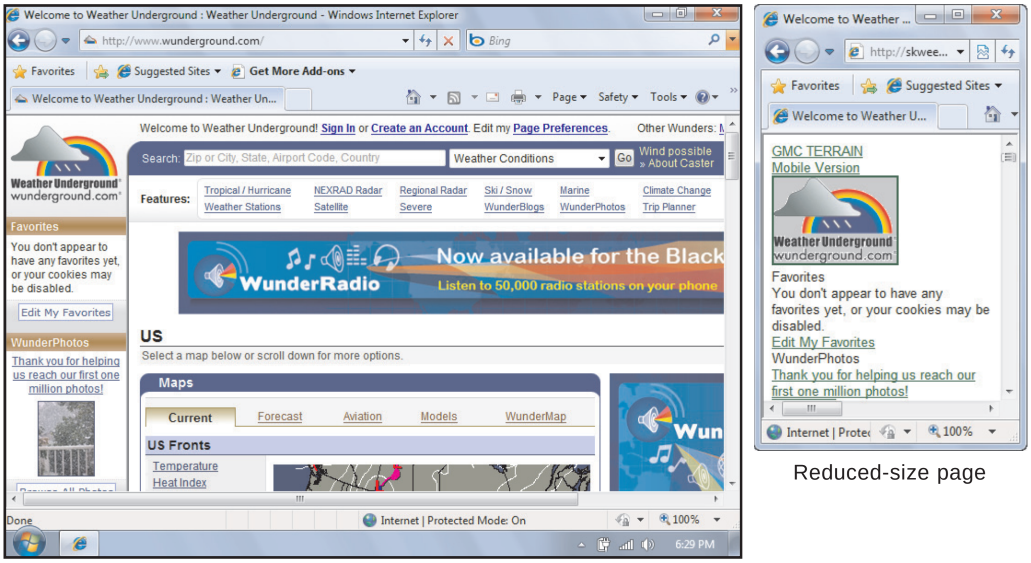
To offset the disadvantages of small screens and slow data transfers, most mobile devices access the Web with microbrowsers rather than full-fledged desktop browsers. A **microbrowser** is a specially designed Web browser optimized to display Web pages on small screens. Microbrowsers come in two varieties: WAP and HTML.

A **WAP browser** provides access to special Web sites designed to fit coherently in limited screen real estate. WAP (Wireless Application Protocol) sites are primarily text-based to keep data transfer to a minimum. The sites are created using WML (Wireless Markup Language) rather than HTML. Some popular sites on the mobile Web include WAP versions of BBC News, ESPN, Google Maps, Yellow Pages, Citysearch, Weather.com, Amazon.com, and USA Today.

To venture outside of the mobile Web and see the same sites as on your desktop or notebook PC, you can use an **HTML microbrowser** that displays standard HTML documents. The browsers included with Palm webOS, Android OS, and iPhone OS, for example, can handle the same Web pages accessed by a standard desktop browser. HTML microbrowsers use various methods for dealing with small screens. Apple's iPhone Safari browser displays an entire Web page; and though the text might initially be too small to read, you can easily touch any part of the page to zoom up to a magnified view.

If you're using an HTML microbrowser with your mobile device but have a slow connection, you can use mobile portals, such as Skweezer or BareSite.com, to shrink Web pages and strip out unwieldy graphics that slow down transmission. These reduced-size pages can be downloaded almost ten times faster than the original pages. In Figure 8-10, you can compare a standard Web page with one that has been sized for a smartphone display using Skweezer.

Figure 8-10


Welcome to Weather Underground : Weather Underground - Windows Internet Explorer
http://www.wunderground.com/
Bing
Favorites
Suggested Sites
Get More Add-ons
Welcome to Weather Underground : Weather Un...
Page
Safety
Tools
Welcome to Weather Underground! Sign In or Create an Account. Edit my Page Preferences.
Other Wunders:
Weather Underground wunderground.com
Search:
Zip or City, State, Airport Code, Country
Weather Conditions
Go
Wind possible
» About Caster
Features:
Tropical / Hurricane
Weather Stations
NEXRAD Radar
Satellite
Regional Radar
Severe
Ski / Snow
WunderBlogs
Marine
WunderPhotos
Climate Change
Trip Planner
Favorites
You don't appear to have any favorites yet, or your cookies may be disabled.
Edit My Favorites
WunderPhotos
Thank you for helping us reach our first one million photos!
WunderRadio
Now available for the Black
Listen to 50,000 radio stations on your phone
US
Select a map below or scroll down for more options.
Maps
Current
Forecast
Aviation
Models
WunderMap
US Fronts
Temperature
Heat Index
Done
Internet | Protected Mode: On
100%
6:29 PM
Welcome to Weather ...
http://skwee...
Favorites
Suggested Sites
Welcome to Weather U...
GMC TERRAIN
Mobile Version
Weather Underground wunderground.com
Favorites
You don't appear to have any favorites yet, or your cookies may be disabled.
Edit My Favorites
WunderPhotos
Thank you for helping us reach our first one million photos!
Internet | Protec
100%

Full-size page

Reduced-size page

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Project

Explore the Web

The Web has made the world a much smaller place, allowing people of all cultures and languages to have a wealth of information at their fingertips. To enable you to comfortably surf the Web for documents, videos, music, photos, and all sorts of products, you were introduced to two of the Web's most significant tools—browsers and search engines. You also learned about using mobile devices to browse the Web.

When you have completed the project, you should be able to:

- Identify the elements in a browser's user interface.
- Use a search engine and formulate both simple and complex searches.
- Analyze a Web site's strengths and weaknesses.
- Navigate to different Web pages using text and graphic links.
- Research topics using the Wikipedia Web site.

Requirements: This project requires Microsoft Windows 7, a browser, and Paint. Word processing software or e-mail are optional for submitting deliverables electronically.

Deliverables:

1 A screenshot of your home page with the home page URL circled and five browser interface icons labeled

2 The number of hits resulting from the following searches:
  a. Renaissance art
  b. "Renaissance art"
  c. Italy and "Renaissance art"
  d. Italy and "Renaissance art" excluding architecture

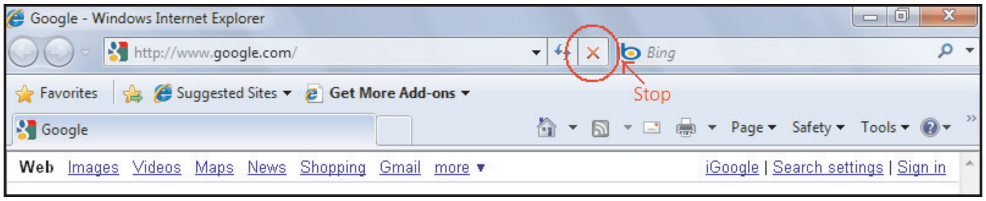
3 A screenshot of the Google page after you've entered a search that returns at least one hit but not more than ten hits

4 Five things you like and don't like about the Weather Channel Web site

5 A screenshot of the first page covering a topic that you've selected in Wikipedia

1. The three most popular browsers for PCs are Internet Explorer , Firefox , and Chrome . Click the browser icon in the Start menu or on the taskbar to start your browser. The initial page displayed by your browser is referred to as your home page. Using the Print Screen key and the Paint program, take a screenshot of your home page. Use Paint tools to circle the URL of your home page. Leave the Paint window open and switch to your browser.

2. Study the browser's user interface. Rest your pointer on all icons in the interface to display their ScreenTips. Switch back to Paint and label five icons with their corresponding functions. An example for one icon is shown below. Save your screen capture as **Project 8A** [**Your Name**] and close Paint.



3. Suppose you want to research Renaissance art. If Google is not displayed as your home page, click your browser's address bar, type **www.google.com**, and press the Enter key. In Google's Search box, type **Renaissance art** and click the Search button. Write down the number of hits from this search.

• Explore the Web (continued)

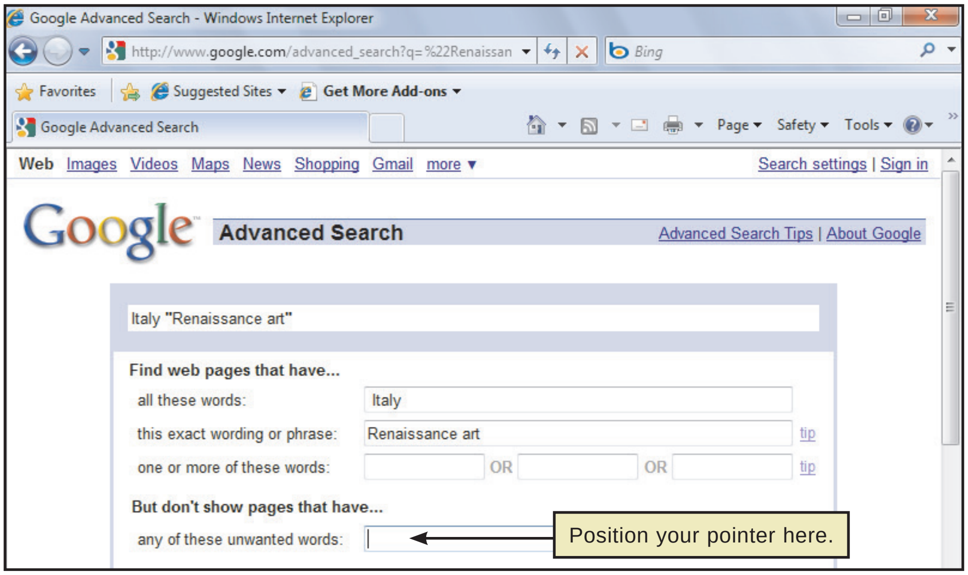
4. In Step 3, Google returned all occurrences of the words “Renaissance” *and* “art.” To search for an exact phrase, enclose the phrase in quotes. Put quotes around *Renaissance art*, click the Search button, and then write down the number of hits.

5. Suppose you want to focus on Renaissance art in Italy. Type **Italy** after “Renaissance art” and click the Search button. Write down the number of hits.

6. You can use Google’s Advanced Search feature to help formulate your search. Suppose you want to exclude architecture from your research and you don’t know how. Click the Advanced Search link to the right of the Search box.

7. On the Advanced Search page, Google has automatically filled in the first two boxes with your original search criteria. Note that in the box beside *this exact wording or phrase*, Renaissance art does not have to be in quotes.

8. Position your pointer in the box beside *any of these unwanted words*, as in the example below. Type **architecture** and then press the Enter key. Write down the number of hits. For future reference, note that Advanced Search used the minus sign (without a space after) to exclude *architecture* from the search.


Google Advanced Search - Windows Internet Explorer
http://www.google.com/advanced_search?q=%22Renaissan
Bing
Favorites
Suggested Sites
Get More Add-ons
Google Advanced Search
Page
Safety
Tools
Web
Images
Videos
Maps
News
Shopping
Gmail
more
Search settings | Sign in
Google
Advanced Search
Advanced Search Tips | About Google
tip
tip

Italy "Renaissance art"

Find web pages that have...

all these words: Italy

this exact wording or phrase: Renaissance art

one or more of these words: OR OR

But don't show pages that have...

any of these unwanted words:

Position your pointer here.

9. Formulate a search that returns at least one hit but not more than ten. You can use the Advanced Search feature to further refine your search. When the results of your search are displayed, take a screenshot of the Google results page and save it as **Project 8B** [**Your Name**]. Close Paint.

10. In the browser’s address bar, type **www.weather.com** and press the Enter key. Study The Weather Channel’s home page. Click various text and graphics links. Check your local weather. You can use the Web site’s Home tab or your browser’s Back button to go back to the site’s home page. Write down five things you like and five things you don’t like about the Weather Channel site.

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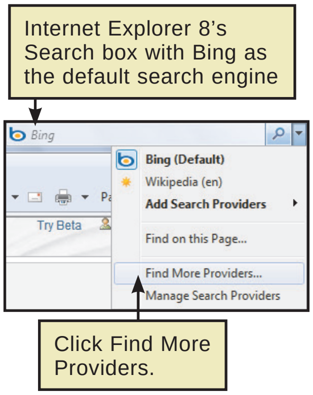
• Explore the Web (continued)

11. Wikipedia is a free encyclopedia that the general public is allowed to edit. To find out more about it, type **en.wikipedia.org/wiki/Main_Page** and press the Enter key. Familiarize yourself with the Web site by clicking several links. Now go back to the main page and locate the Search box. (Look in the column on the left side of the page.) Type in any word or topic that's interesting to you—fishing, for example—and click Go.

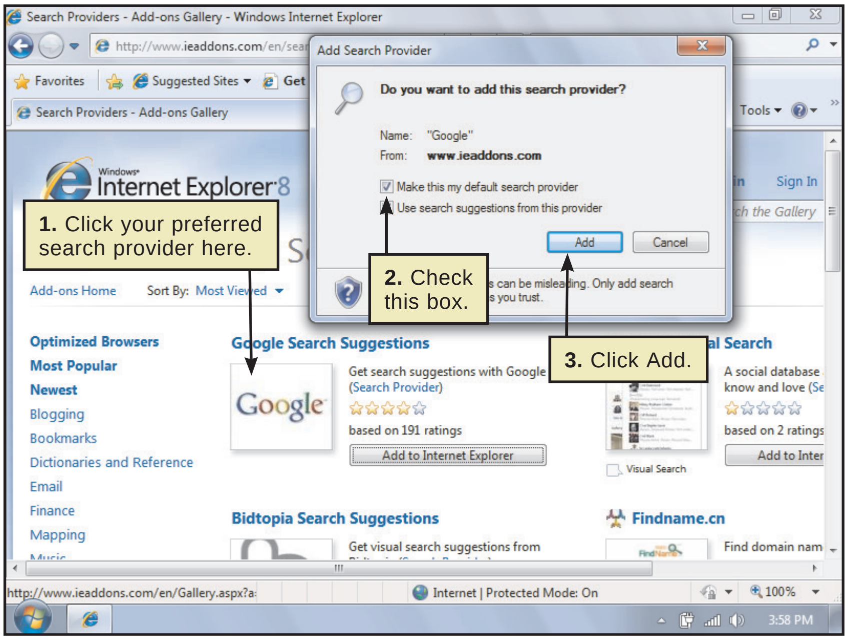
12. Take a screenshot of the first page covering your topic and save it as **Project 8C** [**Your Name**]. Close Paint.

13. If your browser is Internet Explorer 7, you can enter your search terms in the Search box located in the upper-right corner of the browser window. Even though Internet Explorer's default search engine is Microsoft's Bing, you can change the default to any search provider you choose. Click the down-arrow button to the right of the Search box. Click the Find More Providers option.


Internet Explorer 8's Search box with Bing as the default search engine

Click Find More Providers.
Bing
Bing (Default)
Wikipedia (en)
Add Search Providers
Find on this Page...
Find More Providers...
Manage Search Providers
Try Beta

14. Select your favorite provider from the list. Check the box for *Make this my default search provider*, and then click Add. In the example below, Google is being selected as the default search engine. Close your browser.


Add Search Provider

Do you want to add this search provider?

Name: "Google"
From: www.ieaddons.com

☑ Make this my default search provider
☐ Use search suggestions from this provider

1. Click your preferred search provider here.

2. Check this box.

3. Click Add.
Search Providers - Add-ons Gallery - Windows Internet Explorer
http://www.ieaddons.com/en/sear
Favorites
Suggested Sites
Get
Search Providers - Add-ons Gallery
Tools
Windows Internet Explorer 8
Sign In
ch the Gallery
Add
Cancel
s can be misleading. Only add search
s you trust.
Add-ons Home
Sort By: Most Viewed
Optimized Browsers
Most Popular
Newest
Blogging
Bookmarks
Dictionaries and Reference
Email
Finance
Mapping
Google Search Suggestions
Get search suggestions with Google (Search Provider)
based on 191 ratings
Add to Internet Explorer
al Search
A social database know and love (Se
based on 2 ratings
Add to Inter
Visual Search
Bidtopia Search Suggestions
Get visual search suggestions from
Findname.cn
Find domain nam
http://www.ieaddons.com/en/Gallery.aspx?a:
Internet | Protected Mode: On
100%
3:58 PM

15. Consolidate the deliverables for Project 8 into printed format, a document file, or an e-mail message as specified by your instructor.

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Issue

Is it filtering or censorship?

Democracies have a rich tradition of free speech and a free press that stands watch against censorship. Developments on the Internet have brought new attention to the tug-of-war between free speech and public decency. Without too much effort, anyone surfing the Internet can find some very unsavory material, including child pornography, hate group rhetoric, terrorist handbooks, graphic violence, and sexually explicit Web pages.

Many parents are concerned about what their children might encounter while surfing the Web. Even an innocent search for “Valentine” might lead to Web sites where sex is for sale. **Filtering software** makes it possible to block access to certain Web sites. Most operating systems include basic filtering software, and more sophisticated products can be purchased from third-party developers. Parents can activate this software on their home PCs, select the sites that they want to block, and use a password to prevent anyone else from removing the blocks.

In many communities, children also have access to the Internet from computers at school and the public library. Although filtering software makes it possible to block access to sites on these PCs, some librarians are reluctant to use it. They fear that it would be impossible to reach a consensus on the sites that should be filtered.

Even more controversial is the use of broad-scale filtering by government censors. Many dictatorial regimes do not want their citizens to have access to political and cultural ideas that conflict with official government ideology. More than 20 countries use sophisticated tools to block Web sites, filter e-mail, and censor discussion groups. Technology giants, such as Microsoft, Yahoo!, and Cisco Systems, have been criticized for providing foreign governments with tools for blocking culturally objectionable sites. Critics question whether companies in a free society should aid foreign governments’ attempts to censor cyberspace.

What do you think?

1. If you had children, would you use filtering software on your home PC to block access to certain Web sites? ○ Yes ○ No ○ Not sure
2. Do you think schools and public libraries that provide Internet access to children should use filtering software? ○ Yes ○ No ○ Not sure
3. Should a government prevent its citizens from accessing Web-based material that does not conform with its political and cultural agenda? ○ Yes ○ No ○ Not sure

Save It!

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QuickCheck A

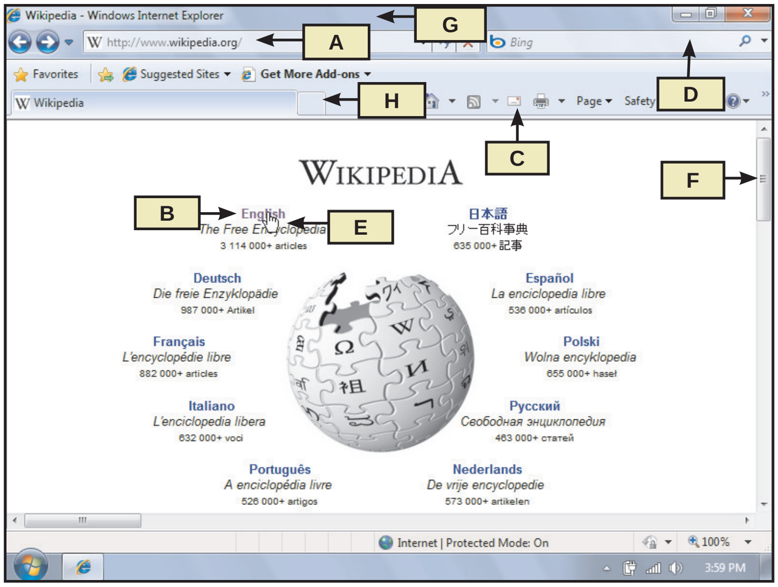
1. Now that you understand how URLs are constructed, you could guess that the URL for Microsoft's home page is http:// ☐ .
2. Your PC is able to display a Web page correctly because your browser can interpret ☐ tags. (Hint: Use the acronym.)
3. When you shop at an e-commerce site, the site's Web server will probably create a(n) ☐ and store it on your PC.
4. True or false? When in doubt, enter a URL using all lowercase letters. ☐
5. Yahoo! and Google are popular ☐ engines.

CheckIt!

QuickCheck B

Fill in the letter from the diagram that correctly matches each description below.

1. A text link ☐
2. A URL ☐
3. The link pointer ☐
4. Tabs ☐
5. Browser toolbar ☐


Wikipedia - Windows Internet Explorer
G
http://www.wikipedia.org/
A
Bing
Favorites
Suggested Sites
Get More Add-ons
Wikipedia
H
Page
Safety
D
C
WIKIPEDIA
F
B
English
The Free Encyclopedia
3 114 000+ articles
E
日本語
フリー百科事典
635 000+ 記事
Deutsch
Die freie Enzyklopädie
987 000+ Artikel
Español
La enciclopedia libre
536 000+ artículos
Français
L'encyclopédie libre
882 000+ articles
Polski
Wolna encyklopedia
655 000+ haseł
Italiano
L'enciclopedia libera
632 000+ voci
Русский
Свободная энциклопедия
463 000+ статей
Português
A enciclopédia livre
526 000+ artigos
Nederlands
De vrije encyclopedie
573 000+ artikelen
Internet | Protected Mode: On
100%
3:59 PM

CheckIt!

GetIt?

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 8.

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CHAPTER 9

Sending E-Mail and Attachments

What's Inside?

Chapter 9 takes you from e-mail basics to more advanced topics such as attachments and file compression. You'll get some tips on avoiding spam, and in the hardware section you'll learn about another computer-based communications technology, voice over IP.

- **FAQs:**

  - How does e-mail work? 127
  - How do I use local e-mail? 128
  - How do I use Web-based e-mail? 129
  - How do I organize messages and contacts? 130
  - What is an e-mail attachment? 131
  - Is there a size limit for e-mail messages and attachments? 132
  - What is spam? 133
- **Hardware:** Voice over IP 134
- **Project:** Explore e-mail 137
- **Issue:** Just how private is e-mail? 140
- **QuickChecks** 141

What's on the CD?

In addition to the basics of creating, reading, replying to, and forwarding e-mail, you'll learn how to use both Web-based and local e-mail, how to send attachments, and how to compress those attachments for more efficient transmission.

- Learn how to use local e-mail 128
- Discover how to use Web-based e-mail 129
- Discover how to organize your mail and contacts 130
- Learn how to open, save, and delete attachments 131
- Find out how to zip and send e-mail attachments 132
- Discover the difference between circuit and packet networks 135
- Look at a Web app that rates your connection's viability for VoIP 136

FAQ How does e-mail work?

E-mail (also called email or electronic mail) is an electronic version of the postal system. An **e-mail message** is a digital document that can be transmitted from one computer to another, usually over the Internet. E-mail has become enormously popular because it is easy to use, delivers mail in a matter of minutes, and lets you broadcast the same message simultaneously to more than one person.

The computers and software that provide e-mail services form an **e-mail system**. At the heart of a typical e-mail system is an **e-mail server**—a computer that essentially acts as a central post office serving a group of people. It runs special **e-mail server software** that provides an electronic mailbox for each person, sorts incoming messages into these mailboxes, and routes outgoing mail over the Internet to other e-mail servers. Many ISPs maintain an e-mail server to handle electronic mail for their subscribers. To access an e-mail system, you must have an account on an e-mail server and your PC must have software that helps you read, compose, and send messages.

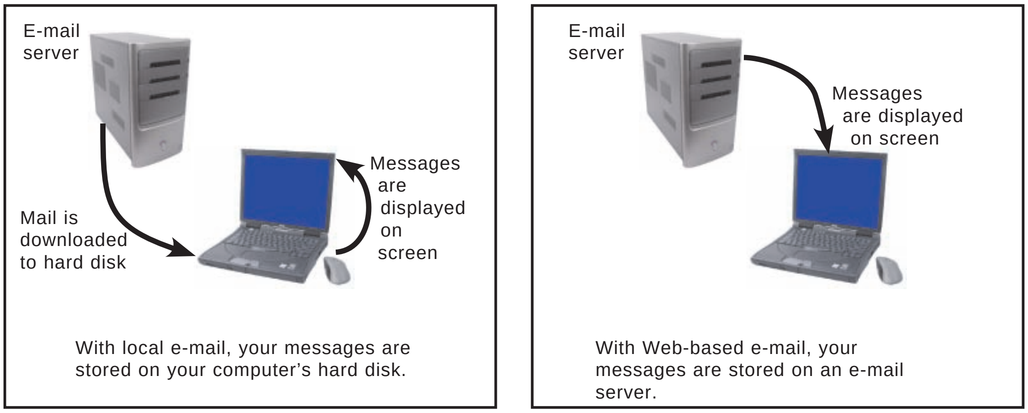
E-mail is based on **store-and-forward technology**, which means that an e-mail server stores incoming messages until your client computer connects and requests them. The server then forwards this mail to your computer when you're ready to read it. Using store-and-forward technology, you don't miss any messages that arrive when you're not connected—they're stored on the server.

Two types of e-mail systems are commonly used: Web-based mail and local mail. With **Web-based e-mail**, you connect to the Web to read and compose e-mail messages using Web browser software, such as Internet Explorer or Firefox. Your incoming mail remains on the Web server, rather than your own computer. The advantage of Web-based e-mail is that you can easily access it from any computer that has an Internet connection.

Local e-mail allows you to compose and read your mail while you are offline. It is called local e-mail because you run e-mail software that's installed on your local hard disk or USB drive, and because you store your incoming mail there, too. "Local" doesn't mean that your mail is limited to a local area network; you can use local e-mail to send messages anywhere on the Internet. Local e-mail is sometimes called **POP mail**, a name derived from the Post Office Protocol software used on the e-mail server that holds mail until your computer retrieves it.

Figure 9-1 illustrates the differences between Web-based and local e-mail. Remember, you don't have to limit yourself to one type of e-mail account; you can have a Web-based account and a local account.

Figure 9-1


E-mail server
Mail is downloaded to hard disk
Messages are displayed on screen
E-mail server
Messages are displayed on screen

With local e-mail, your messages are stored on your computer's hard disk.

With Web-based e-mail, your messages are stored on an e-mail server.

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FAQ How do I use local e-mail?

Before you can work with a local e-mail system, you need an e-mail account, an e-mail address, and a password on a POP server. Most ISPs offer e-mail accounts and instructions on how to set one up on your computer. As part of the setup process, you must have local **e-mail client software**, such as Windows Live Mail, Microsoft Outlook, or Mozilla Thunderbird.

When you want to compose or read e-mail messages, your first step is to start your e-mail client. To get your mail, connect to the mail server and download new messages to your **Inbox**, a folder on your PC's hard disk that holds incoming e-mail. Clicking a button labeled Send/Receive usually initiates the download process.

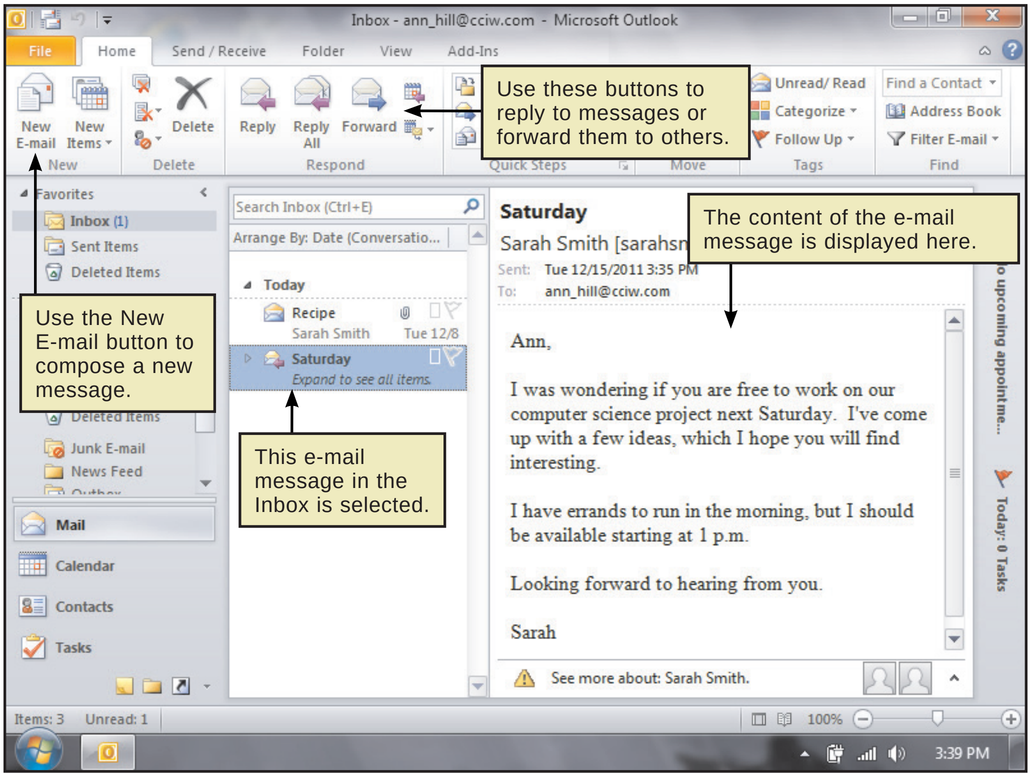
To compose a new message, simply fill in the e-mail header and then type the text of your message. With an always-on Internet connection, you can send each message as it is completed. With a dial-up connection, you can compose your messages offline and queue them in your Outbox. The **Outbox** is a folder on your PC's hard disk that temporarily stores outgoing e-mail messages. When you're ready to send the messages, use the Send/Receive button to connect to the mail server. Your e-mail client software then transmits the message files from your Outbox to the mail server.

Because local e-mail is stored on your computer's hard disk, you control messages once they have been downloaded. But even after you download messages, copies of them remain on backups of the e-mail server, which are not necessarily secure or private. If your computer hard disk crashes, you can't ask your e-mail provider to supply you with backups, so it is your responsibility to back up your mail. Consult the Help file for your e-mail client software to find out how to archive your e-mail to protect it in case of a hardware failure.

Click the Try It! button for an overview of local e-mail using Microsoft Outlook; you'll see how to use basic features as well as how to set up an account.

TryIt!

Figure 9-2


Inbox - ann_hill@cciw.com - Microsoft Outlook
File
Home
Send / Receive
Folder
View
Add-Ins
New E-mail
New Items
New
Delete
Delete
Reply
Reply All
Forward
Respond
Quick Steps
Move
Unread/ Read
Categorize
Follow Up
Tags
Find a Contact
Address Book
Filter E-mail
Find
Favorites
Inbox (1)
Sent Items
Deleted Items
Deleted Items
Junk E-mail
News Feed
Outbox
Mail
Calendar
Contacts
Tasks
Search Inbox (Ctrl+E)
Arrange By: Date (Conversatio...
Today
Recipe
Sarah Smith
Tue 12/8
Saturday
Expand to see all items.
No upcoming appointme...
Today: 0 Tasks
See more about: Sarah Smith.
Items: 3
Unread: 1
100%
3:39 PM

Saturday
Sarah Smith [sarahsm
Sent: Tue 12/15/2011 3:35 PM
To: ann_hill@cciw.com

Ann,

I was wondering if you are free to work on our computer science project next Saturday. I've come up with a few ideas, which I hope you will find interesting.

I have errands to run in the morning, but I should be available starting at 1 p.m.

Looking forward to hearing from you.

Sarah

Use these buttons to reply to messages or forward them to others.

The content of the e-mail message is displayed here.

Use the New E-mail button to compose a new message.

This e-mail message in the Inbox is selected.

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FAQ How do I use Web-based e-mail?

Before you can use Web-based e-mail, you need an account with an e-mail service, such as Google Gmail, MSN Hotmail, or Yahoo! Mail. To obtain a Web-based e-mail account, connect to the provider's Web site and enter the information required to obtain an e-mail address, a user ID, and a password.

Armed with these identifiers, you can use a browser to connect to the e-mail Web site. At the Web site, you can write, read, reply to, and delete e-mail messages. In addition to basic e-mail activities, your Web-based e-mail provider might provide tools for automatically filtering your messages and distributing them into separate folders, based on the subject of the message or the person who sent it.

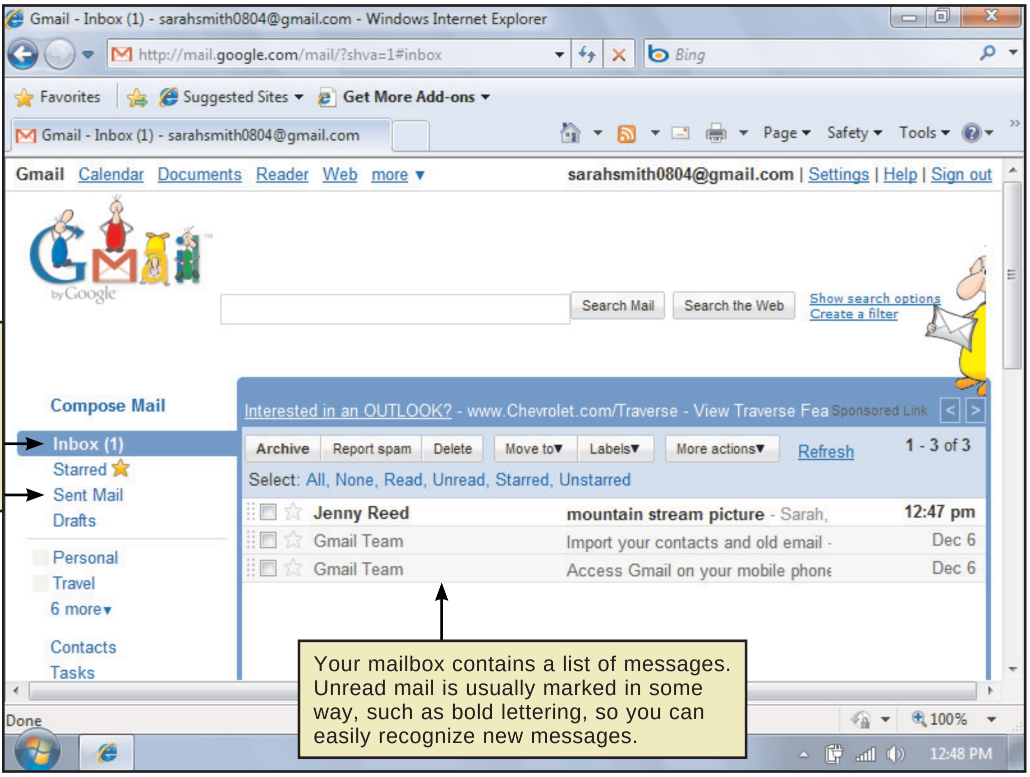
Most Web-based e-mail providers also provide subscribers with tools to block unwanted messages, report nuisance e-mail, and deal with malicious exploits that could result in identity theft. Make sure to check Help for your Web-based e-mail to become familiar with all the tools available to you.

One of the advantages of Web-based e-mail is its availability from any computer that's connected to the Internet. Accessibility is a great feature when you're traveling or on the go and don't have your own computer with you. You can get your mail from a computer in a school lab, at work, in a coffee shop, or in an airport. When using a public computer to access your e-mail account, it is important to log off when you are done to make sure that unauthorized persons do not use your account.

Disadvantages of Web-based e-mail include not being able to access mail during an Internet outage, and the potential privacy risk of storing your e-mail on a remote server where your messages could be accessed without your knowledge or approval. Click the Try It! button for an overview of Web-based e-mail.

Try It!

Figure 9-3


Gmail - Inbox (1) - sarahsmith0804@gmail.com - Windows Internet Explorer
http://mail.google.com/mail/?shva=1#inbox
Bing
Favorites
Suggested Sites
Get More Add-ons
Gmail - Inbox (1) - sarahsmith0804@gmail.com
Page
Safety
Tools
Gmail
Calendar
Documents
Reader
Web
more
sarahsmith0804@gmail.com | Settings | Help | Sign out
Gmail by Google
Search Mail
Search the Web
Show search options
Create a filter
Compose Mail
Inbox (1)
Starred
Sent Mail
Drafts
Personal
Travel
6 more
Contacts
Tasks
Interested in an OUTLOOK? - www.Chevrolet.com/Traverse - View Traverse Fea Sponsored Link
Archive
Report spam
Delete
Move to
Labels
More actions
Refresh
1 - 3 of 3
Select: All, None, Read, Unread, Starred, Unstarred
Done
100%
12:48 PM

Jenny Reed	**mountain stream picture** - Sarah,	**12:47 pm**
Gmail Team	Import your contacts and old email -	Dec 6
Gmail Team	Access Gmail on your mobile phone	Dec 6

Your Inbox and Sent Mail folders hold copies of incoming and outgoing mail.

Your mailbox contains a list of messages. Unread mail is usually marked in some way, such as bold lettering, so you can easily recognize new messages.

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FAQ How do I organize messages and contacts?

E-mail systems make it easy to blast messages back and forth, almost like a conversation. Messages that pertain to a particular topic are sometimes referred to as a “thread.” If you want to review the thread for a series of e-mail exchanges, it is handy if all the messages in a thread maintain the same subject line. Using the Reply feature of your e-mail client saves you time by automatically addressing your message to the person who sent the last message, and it maintains the subject line for the thread.

To reply to a message, simply click the Reply button. Your software automatically opens a new message, addresses it, and fills in the subject line. Typically, it also displays the text of the original message. Sometimes, lines of the original message are preceded by a “>” or other symbol. By incorporating the original text with your reply, both you and the message recipient can have a complete record of the correspondence. It is customary to type your reply above the original message, or intersperse your reply within the lines of the original message.

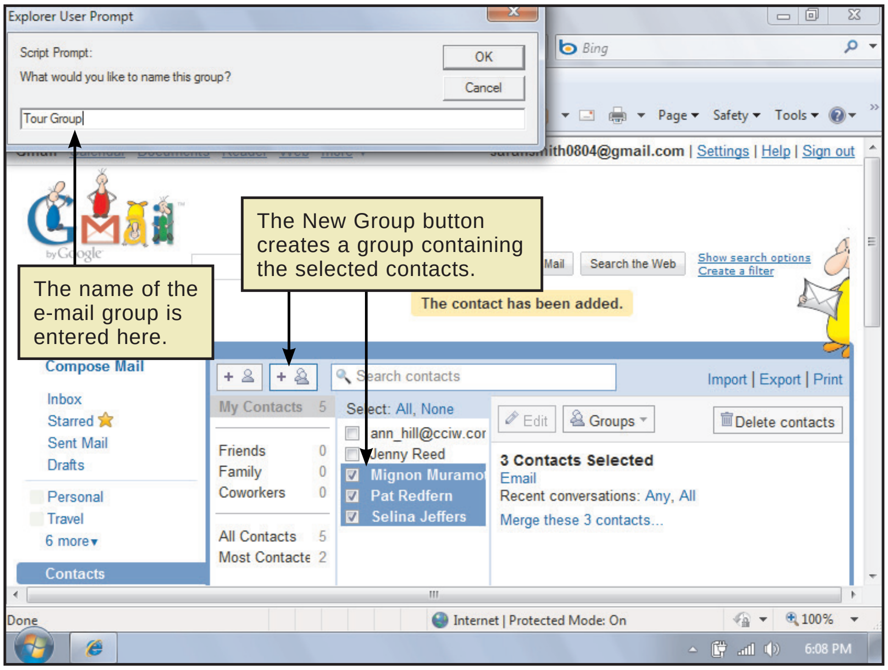
You can also organize messages by creating additional folders in your Inbox. You can create folders for projects, topics, or people you correspond with frequently. Some mail systems can automatically route messages to folders based on the sender or subject line.

You can forward the entire text of a message to a third party if you would like to share its contents and engage additional people in a message thread. Clicking the Forward button copies a selected message and its subject line. All you need to do is fill in the e-mail address for the recipient. Most e-mail software allows you to add comments and change the text of the message you are forwarding. If you do so, include a note explaining your changes, especially if they alter the intent of the original message.

Another organizational technique is to create groups in your address book. An e-mail address book contains a list of contacts. If you find yourself frequently mailing to multiple people, you can collect them into a group. The advantage of a group is that you can send messages to all the members of the group by simply entering the group’s name as shown in Figure 9-4. Click the Try It! button to learn more about creating e-mail groups.

Try It!

Figure 9-4



Explorer User Prompt

Script Prompt:

What would you like to name this group?

Tour Group

The contact has been added.

3 Contacts Selected

☐ ann_hill@cciw.cor
☐ Jenny Reed
☑ Mignon Muramot
☑ Pat Redfern
☑ Selina Jeffers

Recent conversations: Any, All

Merge these 3 contacts...

The name of the e-mail group is entered here.

The New Group button creates a group containing the selected contacts.

OK
Cancel
Bing
Page
Safety
Tools
saransmith0804@gmail.com | Settings | Help | Sign out
Gmail by Google
Mail
Search the Web
Show search options
Create a filter
Compose Mail
Inbox
Starred
Sent Mail
Drafts
Personal
Travel
6 more
Contacts
Search contacts
Import | Export | Print
My Contacts 5
Friends 0
Family 0
Coworkers 0
All Contacts 5
Most Contacte 2
Select: All, None
Edit
Groups
Delete contacts
Email
Done
Internet | Protected Mode: On
100%
6:08 PM

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FAQ What is an e-mail attachment?

E-mail systems were originally designed for sending short, text-only messages. If you want to send graphics, video, music, software, or large document files, you can use e-mail attachments. An **e-mail attachment** is a file that travels along with an e-mail message. You can attach files that are in virtually any format, including DOCX, Windows Bitmap, MP3, and EXE.

Most e-mail software indicates the existence of an attachment with an icon, such as a paper clip. Typically, the person who receives an attachment can double-click the icon to open the attachment. However, it opens only if the recipient's PC has software that can work with files stored in the format of the attachment. For example, if you receive an e-mail message with a DOCX attachment, your PC must have Microsoft Word software to open and display the attachment.

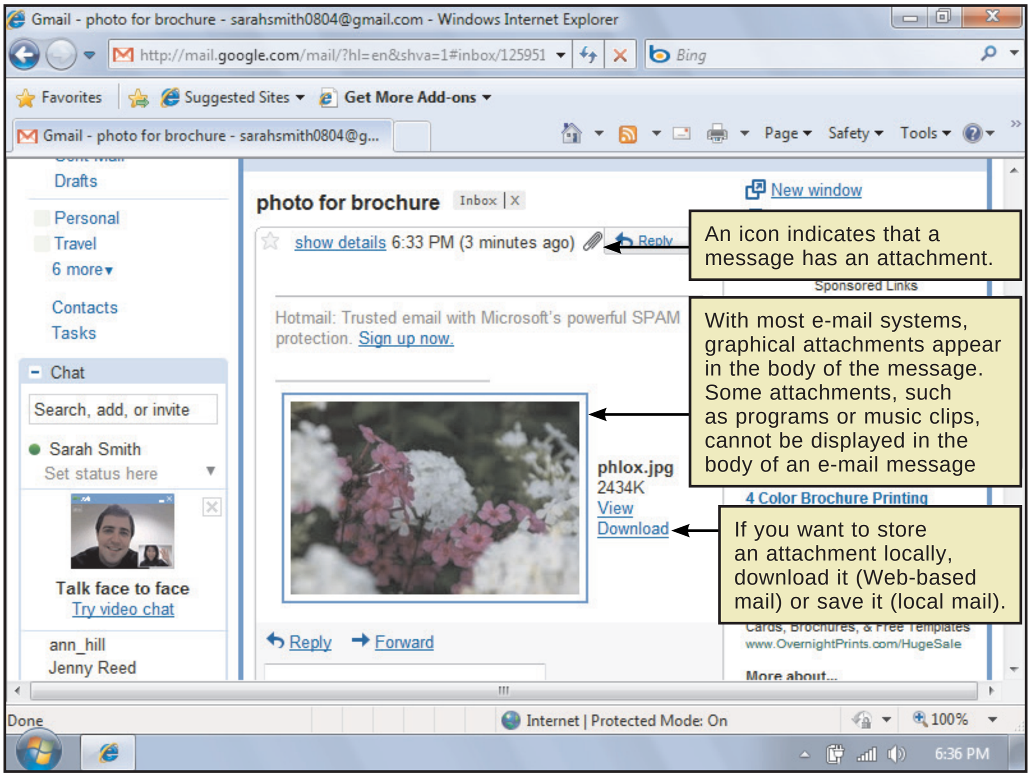
To help the recipient open your attachment, in the body of the regular e-mail message you should indicate which software you used to create the attachment. You might say, for example, "This e-mail includes a DOCX attachment created with Microsoft Word 2010."

Some attachments harbor viruses, so you should exercise caution when opening them—especially those with an .exe extension. Never open an e-mail attachment from an unknown sender. Most antivirus software automatically scans attachments as they are delivered to your Inbox. Check your antivirus software to make sure this feature is turned on.

Figure 9-5 explains more about e-mail attachments. Click the Try It! button to learn how to open attachments, save them, or delete them.

Try It!

Figure 9-5


Gmail - photo for brochure - sarahsmith0804@gmail.com - Windows Internet Explorer
http://mail.google.com/mail/?hl=en&shva=1#inbox/125951
Bing
Favorites
Suggested Sites
Get More Add-ons
Gmail - photo for brochure - sarahsmith0804@g...
Page
Safety
Tools
Drafts
Personal
Travel
6 more
Contacts
Tasks
Chat
Search, add, or invite
Sarah Smith
Set status here
Talk face to face
Try video chat
ann_hill
Jenny Reed
photo for brochure
Inbox
New window
show details 6:33 PM (3 minutes ago)
Reply
Sponsored Links
Hotmail: Trusted email with Microsoft's powerful SPAM protection. Sign up now.
phlox.jpg
2434K
View
Download
4 Color Brochure Printing
Cards, Brochures, & Free Templates
www.OvernightPrints.com/HugeSale
More about...
Reply
Forward
Done
Internet | Protected Mode: On
100%
6:36 PM

An icon indicates that a message has an attachment.

With most e-mail systems, graphical attachments appear in the body of the message. Some attachments, such as programs or music clips, cannot be displayed in the body of an e-mail message

If you want to store an attachment locally, download it (Web-based mail) or save it (local mail).

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FAQ Is there a size limit for e-mail messages and attachments?

Some e-mail systems limit the size of e-mail messages and attachments. Typically, this limit ranges from 2 MB to 10 MB. Huge messages clog up mailboxes, however, so you should try to keep the size of attachments below 1 MB. If you want to send a larger file, you might be able to compress it before you attach it.

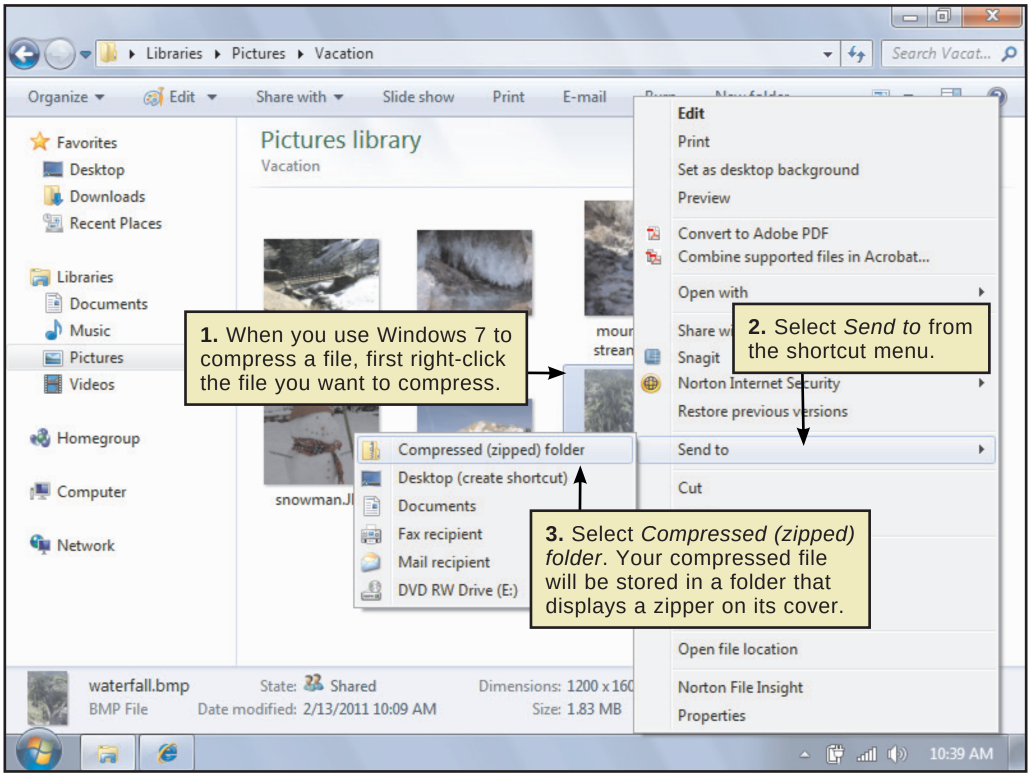
Compression software “zips” or reduces the size of a file using various techniques, such as scanning for patterns of words in a text file or examining patterns of colors in a graphics file and then recoding those patterns using fewer bytes. A compressed version of the original file is stored in a new, smaller file that requires less storage and transmission time. Compressed files usually have a .zip file extension. Before they can be viewed or modified, compressed files have to be unzipped. Some software unzips files automatically. You can also unzip files manually.

Some file formats can be compressed significantly, whereas other file formats don’t seem to compress at all. Many video and sound formats shrink to about half their original size. Most text formats, such as DOCX and TXT, shrink quite dramatically, as do some graphics formats, such as Windows Bitmap and TIFF. Other graphics formats, such as JPEG and GIF, are already compressed, so using compression software does not affect the size of these files. If you’re not sure whether compression software will shrink a file, first try to compress the file, and then compare the original and compressed file sizes shown by your compression software.

Zipped files have an additional advantage; they are not usually blocked by spam filters that are on the lookout for files with .exe, .bat, .com, and .vbs extensions. Click the Try It! button to find out how to use compression software to zip attachments and send them.

Try It!

Figure 9-6


Libraries ▸ Pictures ▸ Vacation
Search Vacat...
Organize
Edit
Share with
Slide show
Print
E-mail
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
Network
Pictures library
Vacation
snowman.J
Edit
Print
Set as desktop background
Preview
Convert to Adobe PDF
Combine supported files in Acrobat...
Open with
Share wi
Snagit
Norton Internet Security
Restore previous versions
Send to
Cut
Open file location
Norton File Insight
Properties
Compressed (zipped) folder
Desktop (create shortcut)
Documents
Fax recipient
Mail recipient
DVD RW Drive (E:)
waterfall.bmp
BMP File
State: Shared
Date modified: 2/13/2011 10:09 AM
Dimensions: 1200 x 160
Size: 1.83 MB
10:39 AM

1. When you use Windows 7 to compress a file, first right-click the file you want to compress.

2. Select *Send to* from the shortcut menu.

3. Select *Compressed (zipped) folder*. Your compressed file will be stored in a folder that displays a zipper on its cover.

FAQ What is spam?

One of e-mail's main disadvantages is **spam**—unwanted electronic junk mail about medical products, low-cost loans, and fake software upgrades that arrives in your online mailbox. Today's proliferation of spam is generated by marketing firms that harvest e-mail addresses from mailing lists, membership applications, and Web sites.

In the past, spam flooding your Inbox with unsolicited and often pornographic messages was merely an annoyance. These days, however, spam has turned into another major hacking tool for cybercriminals. Spam sometimes contains viruses, worms, and other malicious software that can wreak havoc on your computer or steal personal information such as passwords. Spam can also be used for phishing scams. **Phishing** is an e-mail-based scam that's designed to persuade you to reveal confidential information, such as your bank account number or Social Security number.

Another innocuous, but potentially damaging, spam scam starts with an e-mail message that appears to come from a legitimate organization such as a bank, an online payment service, an online store, or even your ISP. The message directs you to click a link to verify confidential data. The link connects you to a bogus site cleverly disguised to look very much like a legitimate Web site. There you are urged to enter your bank account number, PIN, password, credit card number, or other data.

You can reduce the amount of spam that shows up in your Inbox by using spam filters. A **spam filter** is a type of utility software that captures unsolicited e-mail messages before they reach your Inbox. It works by checking the text of e-mail headers and messages based on a series of rules. For example, a rule such as "Message header contains viagra, v1agra, or vi@gra" would help identify spam that's trying to hawk cheap pharmaceuticals. Spam filters are included in most security software.

Another way to reduce spam is to use a disposable e-mail address when you have to register at Web sites that are primarily interested in beefing up their mass mailing databases. A **disposable e-mail address** is simply a Web-based e-mail account that you can discontinue if your account begins to accumulate lots of spam. Figure 9-7 lists steps that can help to reduce the amount of spam you receive.

Figure 9-7

- Never reply to spam when you receive it.
- Don't click links in e-mail messages, even if it's an opt-out link.
- Give your e-mail address only to people from whom you want to receive e-mail. Be wary of providing your e-mail address at Web sites, entering it on application forms, or posting it in public places such as online discussion groups.
- Use a disposable e-mail address when you register for online sites. You can use this disposable address to get your confirmation number for online registrations, but don't use it for regular e-mail correspondence.
- If your e-mail provider offers a way to report spam, use it.
- When spam gets out of hand, consider changing your e-mail account so that you have a different e-mail address.

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Hardware

Voice over IP

Computers have revolutionized communication. E-mail offers a lightning fast way to transmit written messages; it is the digital millennium's answer to the postal service. Digital technology also offers alternatives to analog telephone service based on voice over IP technology.

Voice over IP (VoIP) refers to a set of technologies used to transact voice communications over digital computer networks, such as the Internet. VoIP is also referred to as "Internet telephone" or "IP telephony." VoIP has become a popular alternative to the landline-based Public Switched Telephone Network (PSTN) .

VoIP calls can be less expensive than PSTN service. Computer-to-computer calls are free anywhere in the world. Service plans that allow VoIP subscribers to initiate calls to and from landlines involve monthly or annual fees, but typically costs are significantly less than PSTN service, especially for long-distance calls. VoIP can use a variety of hardware devices to manage calls; some don't require a computer, but all require an Internet connection.

Figure 9-8

Softphone Computer-only VoIP is sometimes referred to as a **softphone** because it uses local or portable software to carry out VoIP calls. Softphone calls take place between participants' computers equipped with microphones and speakers (or headsets). Both participants are required to have compatible softphone software. Computer-to-computer calls are usually free, regardless of where the computer is located. Skype is one of the most popular free softphone services.

Dedicated VoIP phone VoIP communication can take place without the use of a personal computer, microphone, and speakers. A **dedicated VoIP phone** connects directly to your network router's Ethernet port or Wi-Fi signal. The phone itself contains all the software needed to handle calls, so no additional software is required on your computer. Dedicated phones are typically used with paid service plans from a commercial VoIP service provider.

Analog telephone adapter You can connect a standard analog telephone to a VoIP system and convert analog signals into digital data with an **analog telephone adapter** (ATA). The adapter is a small box with a plug for a phone cable and an Ethernet port for connecting the ATA to a network router. When using an ATA, your personal computer is not required to supply software. This setup is common with large-scale VoIP providers, such as cable companies. Vonage and AT&T CallVantage bundle ATAs with service plans.

VoIP peripheral Service providers like magicJack offer a USB device that contains VoIP software and a connector for a conventional analog telephone. Plug your telephone into the USB device, and then plug that into your computer to connect to the Internet.

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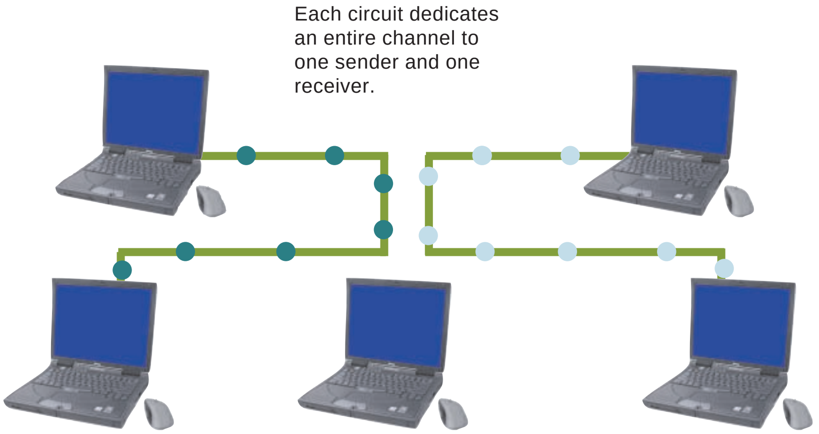
Hardware
(continued)

One reason VoIP is less expensive than PSTN is its use of Internet-style packet switching, rather than circuit switching, which requires a costly dedicated circuit for each call. The telephone system uses a technology called **circuit switching**, which essentially establishes a dedicated, private link between one telephone and another for the duration of a call. As shown in Figure 9-9, this type of switching provides callers with a direct pipeline over which streams of voice data can flow. Click the Play It! button to animate the diagram.

PlayIt!

Figure 9-9

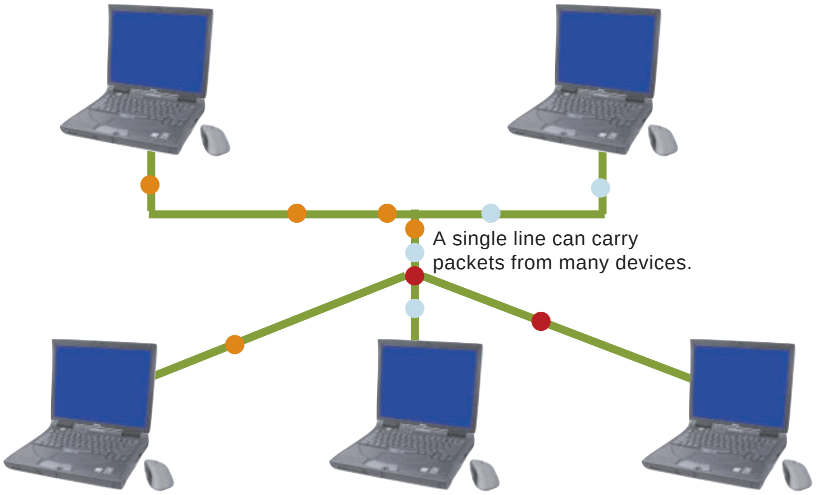

Each circuit dedicates an entire channel to one sender and one receiver.

Unfortunately, circuit switching is rather inefficient. For example, when someone is on hold, no communication is taking place—yet the circuit is reserved and cannot be used for other communications. Packet switching offers a more efficient technology.

Packet switching divides a message into several packets that can be routed independently to their destination. Packets from many different messages can share a single communications channel, or circuit. Packets are shipped over the circuit on a first-come, first-served basis. If some packets from a message are not available, the system does not need to wait for them. Instead, the system moves on to send packets from other messages. The end result is a stream of data from different messages all traveling along the same circuit as shown in Figure 9-10.

PlayIt!

Figure 9-10


A single line can carry packets from many devices.

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Hardware

(continued)

Packet switching is not perfect, and VoIP is susceptible to a range of problems that can severely deteriorate call quality causing echoes, distortion, warbling, and clipping. Factors that affect VoIP call quality include connection speed, latency, jitter, and packet loss.

You might be paying for a 6 Mbps Internet connection, but the actual capacity can be far less. As you learned in an earlier chapter, you can use online tools to check the actual capacity of your connection. 128 Kbps is minimally acceptable for VoIP, and most experts suggest at least 512 Kbps.

Applications such as Ping and Traceroute can help you determine your connection's speed and latency. Satellite Internet connections have unacceptable speed for VoIP because packets travel a long distance to a satellite and back to earth. Even with DSL connections, speed can sometimes exceed 250 ms and negatively affect VoIP call quality.

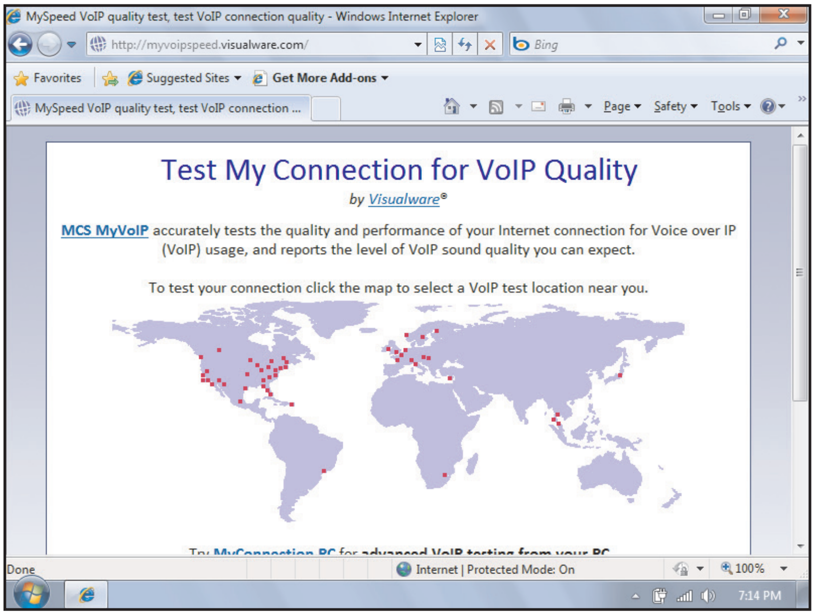
You can think of **jitter** as unevenness in the delivery of packets. Although packets are sent in an evenly spaced stream, network traffic can delay some packets and create erratic data flow. If the variation between packets exceeds 5 ms, VoIP quality is likely to be poor.

Packet loss refers to data that never reaches its destination or gets discarded because it arrives too late to be of any use. TCP packets are supervised from sender to receiver, with built-in error correction. If a packet goes missing, TCP quickly discovers the problem and resends the packet. That works fine for e-mail, FTP, and similar data where a few seconds of delay makes little difference. However, in real-time VoIP communication, TCP error correction takes too long. VoIP uses a protocol called **UDP** (User Datagram Protocol) instead of TCP. UDP does not try to resend dropped packets. An occasional missing packet usually goes unnoticed, but a stream of lost VoIP packets produces the Max Headroom effect; words and even entire phrases are clipped out of the conversation.

Before you invest in VoIP, you can test your Internet connection to see if you'll get acceptable call quality. Web apps like the one in Figure 9-11 evaluate your Internet connection's suitability for VoIP. Click the Try It! button to run through a quick simulation.

Try It!

Figure 9-11


MySpeed VoIP quality test, test VoIP connection quality - Windows Internet Explorer
http://myvoipspeed.visualware.com/
Bing
Favorites
Suggested Sites
Get More Add-ons
MySpeed VoIP quality test, test VoIP connection ...
Page
Safety
Tools
Done
Internet | Protected Mode: On
100%
7:14 PM

Test My Connection for VoIP Quality

by Visualware®

MCS MyVoIP accurately tests the quality and performance of your Internet connection for Voice over IP (VoIP) usage, and reports the level of VoIP sound quality you can expect.

To test your connection click the map to select a VoIP test location near you.

Try MyConnection PC for advanced VoIP testing from your PC

Project

Explore e-mail

In this fast-paced world, e-mail has proven to be such a vital means of communication that one can hardly survive without it. A missed e-mail message can result in losing a prospective job or missing an important meeting. This chapter covered the essentials of e-mail, such as how to use local and Web-based e-mail, forward or reply to messages, and include attachments in your messages. You also learned about the dangers that can lurk inside e-mail messages and how to protect yourself from them.

When you have completed the project, you should be able to:

- Open a Web-based e-mail account.
- Add contacts to the address book.
- Compress files.
- Compose e-mail messages.
- Send messages with attachments.

Requirements: This project requires Microsoft Windows 7, a browser, and Paint.

The deliverable for Project 9 is an e-mail message containing the following:

1 The original file size of your Project 9 screenshot

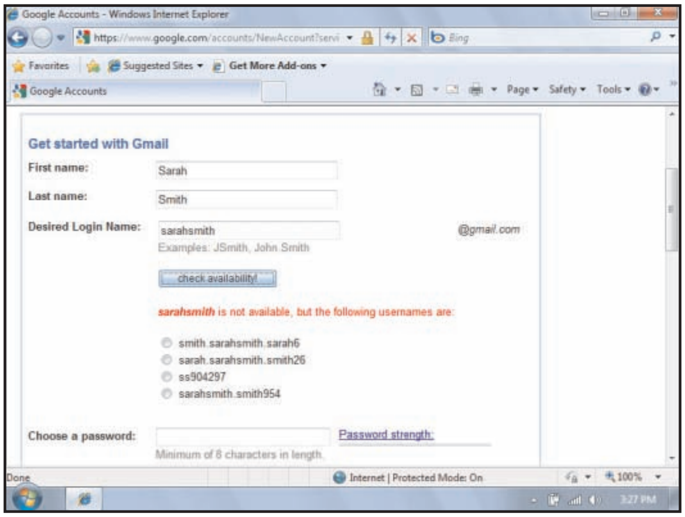
2 The compressed file size of your Project 9 screenshot

3 A list of five netiquette guidelines that you've researched

4 An attachment containing a screen capture of your Gmail window

1. The process of signing up for a Web-based account is fairly straightforward. In this exercise, you will work with Google Gmail. Open your browser. In the browser's address bar type **mail.google.com**, then press the Enter key. If you already have a Gmail account and don't want to create a disposable account to use for unimportant mail, sign in and proceed to Step 8.

2. Click *Create an account* on the lower-right side of the page. An online form should appear. Enter your first name, last name, and desired login name. Click *check availability!* to make sure no one else has chosen the same login name. If the name is unavailable, you can select from a list of suggestions as in the example at right.


Google Accounts - Windows Internet Explorer
https://www.google.com/accounts/NewAccount?servi
Bing
Favorites
Suggested Sites
Get More Add-ons
Google Accounts
Page
Safety
Tools
Done
Internet | Protected Mode: On
100%
3:27 PM

Get started with Gmail

First name: Sarah

Last name: Smith

Desired Login Name: sarahsmith @gmail.com

Examples: JSmith, John Smith

check availability!

sarahsmith is not available, but the following usernames are:

○ smith.sarahsmith.sarah6
○ sarah.sarahsmith.smith26
○ ss904297
○ sarahsmith.smith954

Choose a password: Password strength:

Minimum of 8 characters in length.

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• Explore e-mail (continued)

3. Before typing a password, click *Password strength* on the right of the *Choose a password* box for tips on selecting secure passwords. Enter a password and change it if the password strength is not labeled Strong. Now retype the password in the *Re-enter password* box.

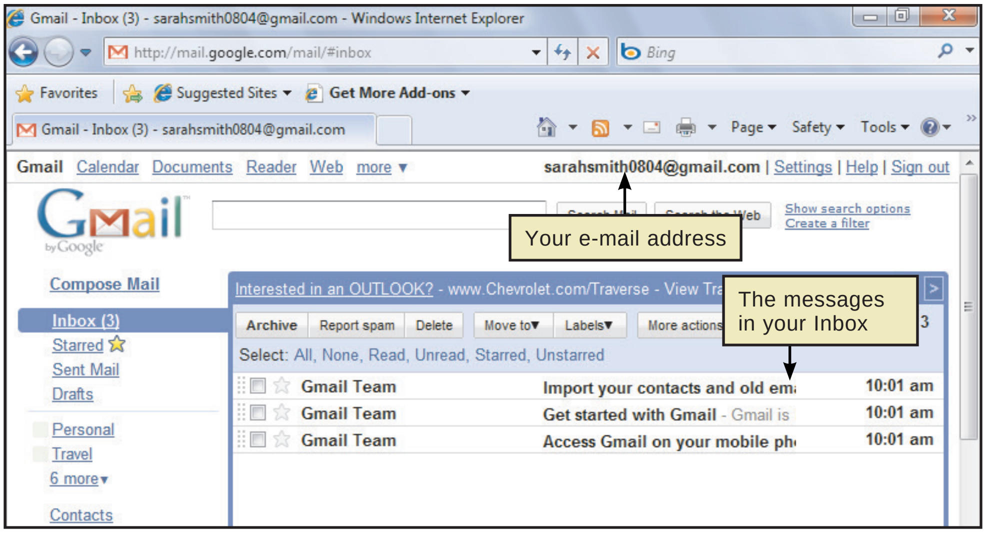
4. Click the down-arrow button in the Security Question box to display a list of questions. If you select *Write my own question*, type the question in the box that is displayed. Enter an answer in the Answer box.

5. Type a secondary e-mail address if you have one. You can skip the Location box if you are in the United States, or you can click the down-arrow button to display a list and select your location.

6. In the Word Verification box, type the characters exactly as you see them. Scroll up to the top of the form to review all your information and make changes if necessary. Read the Terms of Service at the bottom of the page, and then click the *I accept* button to accept the terms. In the *Introduction to Gmail* window, click the *Show me my account* link in the upper-right corner.

7. You should be back at the Gmail home page. Sign in to Gmail with your new username and password.

8. When Gmail opens, it displays your inbox as in the example below. Take a screenshot and save it as a 24-bit Bitmap in the Pictures library with the file name **Project 9 [Your Name]**. Close the Paint window.



Gmail - Inbox (3) - sarahsmith0804@gmail.com - Windows Internet Explorer

http://mail.google.com/mail/#inbox

sarahsmith0804@gmail.com | Settings | Help | Sign out

Interested in an OUTLOOK? - www.Chevrolet.com/Traverse - View Tra

Select: All, None, Read, Unread, Starred, Unstarred

Gmail Team	Import your contacts and old emi	10:01 am
Gmail Team	Get started with Gmail - Gmail is	10:01 am
Gmail Team	Access Gmail on your mobile ph	10:01 am

Your e-mail address

The messages in your Inbox

9. Later in the project you'll send this image to your instructor. Since it is a fairly large file, you should compress it. To do so, open the Start menu and click Pictures. Rest your pointer on the Project 9 file and write down the size that's displayed. Right-click the file, select *Send to*, and then select *Compressed (zipped) folder*. Your compressed file will be stored in a zipped folder named **Project 9 [Your Name]**. Write down the size of the compressed folder. Close the Pictures window.

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• Explore e-mail (continued)

10. Your contacts list (or address book) can be used to store frequently used e-mail addresses. Click the Contacts link on the left side of the screen. If your instructor is not yet listed as a contact, click the New Contact button, located near the top of the Gmail window and then enter your instructor's name and primary e-mail address. Click the Save button.

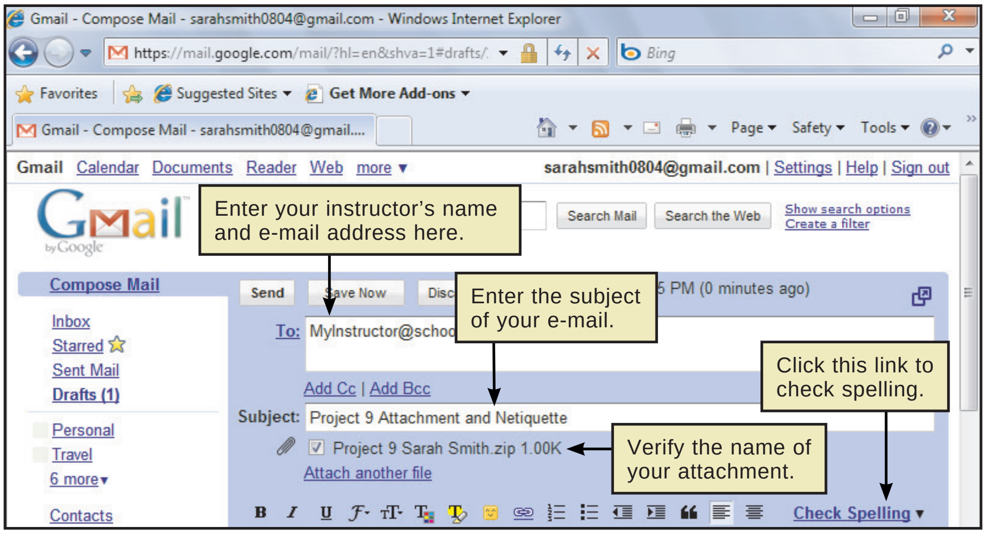
11. Click Compose Mail on the left side of the screen. Start typing the name of your instructor in the To: box. Since your instructor's name is in your contacts list, the correct e-mail address should appear. Click the address.

12. In the Subject box, enter **Project 9 Attachment and Netiquette**. Click *Attach a file* under the Subject box. Select your Project 9 zipped folder and click the Open button.

13. In the message area, compose a message that describes your attachment, including its uncompressed and compressed sizes. Don't send the message yet.

14. **Netiquette** (Internet etiquette) is a set of guidelines for writing civil and concise Web posts and e-mail messages. In the Search box at the top of the Gmail window, type **netiquette** and click the *Search the Web* button. Collect at least five netiquette guidelines that pertain to e-mail and add them to your e-mail message.

15. Before sending the message, click *Check spelling* on the right side of the screen. Correct any errors and click the Send button.


Gmail - Compose Mail - sarahsmith0804@gmail.com - Windows Internet Explorer
https://mail.google.com/mail/?hl=en&shva=1#drafts/
Bing
Favorites
Suggested Sites
Get More Add-ons
Gmail - Compose Mail - sarahsmith0804@gmail....
Page
Safety
Tools
Gmail
Calendar
Documents
Reader
Web
more
sarahsmith0804@gmail.com | Settings | Help | Sign out
Gmail by Google
Search Mail
Search the Web
Show search options
Create a filter
Compose Mail
Inbox
Starred
Sent Mail
Drafts (1)
Personal
Travel
6 more
Contacts
Send
Save Now
Disc
5 PM (0 minutes ago)
Add Cc | Add Bcc
Attach another file
Check Spelling

To: MyInstructor@schoo

Subject: Project 9 Attachment and Netiquette

☑ Project 9 Sarah Smith.zip 1.00K

Enter your instructor's name and e-mail address here.

Enter the subject of your e-mail.

Click this link to check spelling.

Verify the name of your attachment.

16. When you use an online service, you should understand how it could affect your privacy. Click the Privacy Policy link at the bottom of the Gmail window to locate Google's Gmail Privacy Notice. Read the policy to discover how much information Gmail stores about your account use and how it determines what targeted advertising to display in your e-mail window. Close the Gmail Privacy window.

17. For security, you should log out of e-mail when you are not using it. Click the *Sign out* button near the top of the Gmail window. Close your browser to complete the project.

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Issue

Just how private is e-mail?

Most people assume that e-mail has similar privacy protections as telephone conversations and as letters that are carried by the postal service. However, that is not necessarily the case. The electronic technology that makes e-mail so popular also tends to make it less private than a phone call or a letter.

It is easy for the recipient of an e-mail message to forward copies of it to other people. The contents of an e-mail message might appear on a technician's screen in the course of system maintenance or repairs. Also, your e-mail messages—including those that you have deleted from your own PC—might be stored on backups and archives of an e-mail server where you cannot control access to them.

When a Caltech student was accused of sexually harassing a female student by sending lewd e-mail to her and to her boyfriend, investigators retrieved all of the student's e-mail from archives of the e-mail server. The student was expelled from the university even though he claimed that the e-mail had been "spoofed" to make it look as though he had sent it, when it had actually been sent by someone else.

Various government agencies can access e-mail messages, either by requesting them from an ISP or by intercepting them from various devices on the Internet. Theoretically, intercepting e-mail requires a warrant or court order, but legislation aimed at combating terrorism has loosened restrictions, and privacy advocates have discovered incidents in which the U.S. government intercepted domestic communications without due process.

Employee use of company-supplied e-mail accounts is the subject of continuing controversy because employers often monitor e-mail exchanges that take place on company e-mail systems. Your employer should keep you informed of company e-mail privacy policies. Use that information to determine which messages you'll send on the company e-mail system and which you'll send on your personal Web-based or local e-mail account.

Until the legal system resolves the many issues surrounding e-mail, you should think of your e-mail messages as postcards, rather than as letters. Assume that your e-mail message might be read by people other than the person to whom it was sent, and save your controversial comments for face-to-face conversations.

What do you think?

1. Do you think most people believe that their e-mail is private? ○ Yes ○ No ○ Not sure

2. Do you agree with Caltech's decision to expel the student who was accused of sending harassing e-mail to another student? ○ Yes ○ No ○ Not sure

3. Do you think that e-mail should have the same privacy protections as telephone conversations and mail under U.S. laws? ○ Yes ○ No ○ Not sure

Save It!

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QuickCheck A

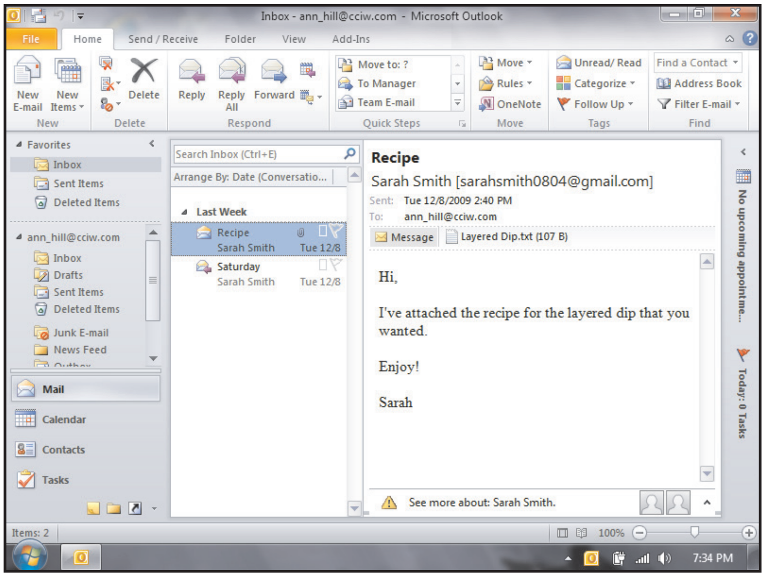
1. True or false? Local e-mail is limited to computers within a business, school, or home LAN. ______
2. Because some e-mail systems impose a size limit on the mail they accept, as a rule of thumb, attachments should be smaller than ______ megabyte(s).
3. Compressed attachments typically have a(n) ______ file extension.
4. ______ refers to an e-mail-based scam designed to fool users into disclosing confidential information.
5. Internet telephony is also referred to as voice over ______ .

Check It!

QuickCheck B

Fill in each blank, based on the e-mail shown at right.

1. The name of the person who wrote this e-mail: ______
2. The recipient's e-mail address: ______
3. Does this e-mail include an attachment? ______
4. The name of this e-mail software: ______
5. The subject of this e-mail: ______


Inbox - ann_hill@cciw.com - Microsoft Outlook
File
Home
Send / Receive
Folder
View
Add-Ins
New E-mail
New Items
New
Delete
Delete
Reply
Reply All
Forward
Respond
Move to: ?
To Manager
Team E-mail
Quick Steps
Move
Rules
OneNote
Move
Unread/ Read
Categorize
Follow Up
Tags
Find a Contact
Address Book
Filter E-mail
Find
Favorites
Inbox
Sent Items
Deleted Items
ann_hill@cciw.com
Inbox
Drafts
Sent Items
Deleted Items
Junk E-mail
News Feed
Outbox
Mail
Calendar
Contacts
Tasks
Search Inbox (Ctrl+E)
Arrange By: Date (Conversatio...
Last Week
Recipe
Sarah Smith
Tue 12/8
Saturday
Sarah Smith
Tue 12/8
No upcoming appointme...
Today: 0 Tasks
Items: 2
100%
7:34 PM

Recipe

Sarah Smith [sarahsmith0804@gmail.com]

Sent: Tue 12/8/2009 2:40 PM

To: ann_hill@cciw.com

Message | Layered Dip.txt (107 B)

Hi,

I've attached the recipe for the layered dip that you wanted.

Enjoy!

Sarah

See more about: Sarah Smith.

Check It!

Get It?

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 9.

CHAPTER 10

Writing and Printing Documents

What's Inside?

A computer with preinstalled software typically includes a software suite or an integrated software package that provides a set of basic tools for producing documents, making calculations, creating presentations, and getting organized. Chapter 10 focuses on software you can use to produce documents.

- **FAQs:**
  - Can word processing software improve my writing? 143
  - How does word processing software help me format a document? 144
  - Does word processing software provide standard document styles? 145
  - What's desktop publishing software? 146
  - Do I need DTP software? 147
- **Hardware:** Printers 148
- **Project:** Explore word processing software 151
- **Issue:** What's truth got to do with it? 154
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What's on the CD?

The Try It! features in Chapter 10 show you how to improve your writing with word processing software and how to create professional publications with desktop publishing software. This chapter's video feature looks at laser printers.

- See a thesaurus, grammar checker, and spelling checker in action 143
- Learn how formatting improves the look of a document 144
- Find out how to use page formats, themes, and templates 145
- Take a tour of desktop publishing software 146
- Get the scoop on laser printers 149
- Find out how to change your default printer 150

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FAQ Can word processing software improve my writing?

Word processing software provides tools for entering and revising text, adding graphical elements, specifying formats, and printing documents. Popular word processing software includes Microsoft Word, Google Docs, and OpenOffice Writer.

Good writing requires a coherent progression of ideas expressed in grammatically correct sentences. Before focusing on how your document looks, pay attention to how it reads by using your word processing software to organize your ideas and clarify your wording. Entering text on screen gives you flexibility to sketch in your main points, then move them around to improve the progression of your ideas.

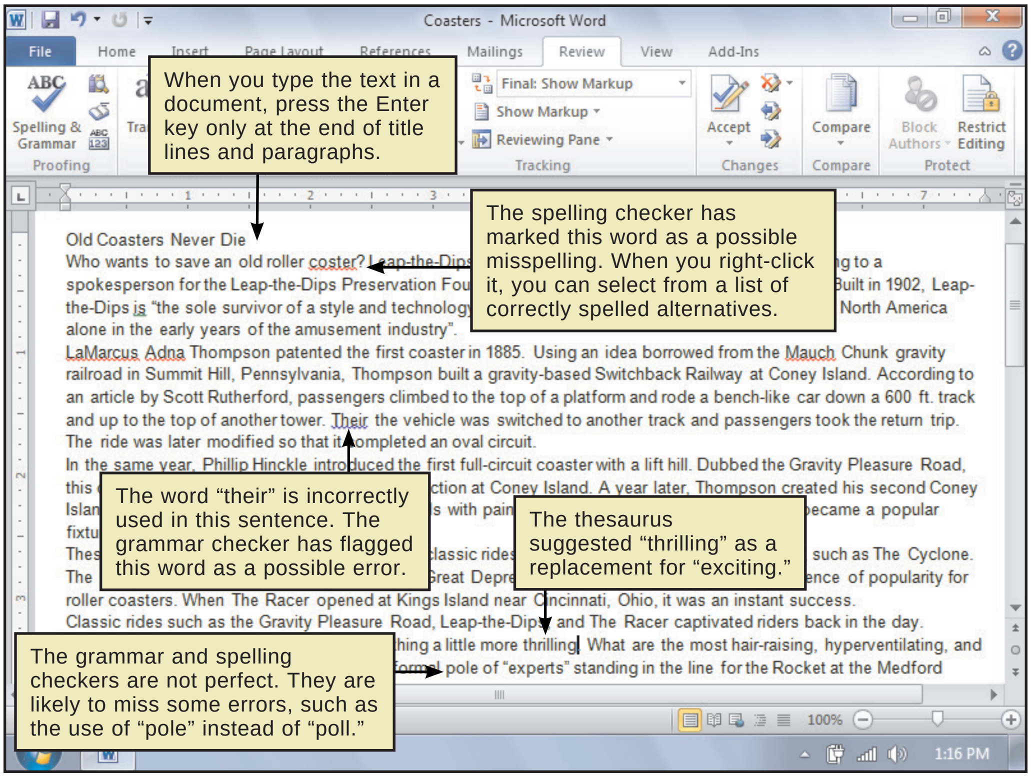
When you first type the raw text for a document, don't press the Enter key at the end of each line—just keep typing. Your word processing software will automatically **word wrap** to the next line. You should, however, press the Enter key at the end of a title, paragraph, or bullet point.

When you're satisfied with the flow of ideas, use your word processing software to improve wording and sentence structure. A built-in **grammar checker** can help you correct grammar errors. To make your writing really sparkle, use the built-in **thesaurus** to find dynamic synonyms for any word you select.

Word processing software can also help you find and fix spelling errors. A **spelling checker** compares each word in your document to an electronic dictionary. For words not found in the dictionary, the spelling checker displays a list of possible corrections. Click the Try It! button to see how your writing can improve when you use a thesaurus, grammar checker, and spelling checker.

Try It!

Figure 10-1



Old Coasters Never Die
Who wants to save an old roller coster? Leap-the-Dips ng to a
spokesperson for the Leap-the-Dips Preservation Fou Built in 1902, Leap-
the-Dips is "the sole survivor of a style and technolog North America
alone in the early years of the amusement industry".
LaMarcus Adna Thompson patented the first coaster in 1885. Using an idea borrowed from the Mauch Chunk gravity
railroad in Summit Hill, Pennsylvania, Thompson built a gravity-based Switchback Railway at Coney Island. According to
an article by Scott Rutherford, passengers climbed to the top of a platform and rode a bench-like car down a 600 ft. track
and up to the top of another tower. Their the vehicle was switched to another track and passengers took the return trip.
The ride was later modified so that it completed an oval circuit.
In the same year, Phillip Hinckle introduced the first full-circuit coaster with a lift hill. Dubbed the Gravity Pleasure Road,
this ction at Coney Island. A year later, Thompson created his second Coney
Islan s with pain became a popular
fixtu
Thes classic rides such as The Cyclone.
The Great Depre ence of popularity for
roller coasters. When The Racer opened at Kings Island near Cincinnati, Ohio, it was an instant success.
Classic rides such as the Gravity Pleasure Road, Leap-the-Dips and The Racer captivated riders back in the day.
hing a little more thrilling. What are the most hair-raising, hyperventilating, and
formal pole of "experts" standing in the line for the Rocket at the Medford

When you type the text in a document, press the Enter key only at the end of title lines and paragraphs.

The spelling checker has marked this word as a possible misspelling. When you right-click it, you can select from a list of correctly spelled alternatives.

The word "their" is incorrectly used in this sentence. The grammar checker has flagged this word as a possible error.

The thesaurus suggested "thrilling" as a replacement for "exciting."

The grammar and spelling checkers are not perfect. They are likely to miss some errors, such as the use of "pole" instead of "poll."

FAQ How does word processing software help me format a document?

You can use your word processing software to **format** a document, changing its appearance to create a professional, high-impact, or casual look. Formatting can be applied to single characters, words, sentences, paragraphs, or an entire page.

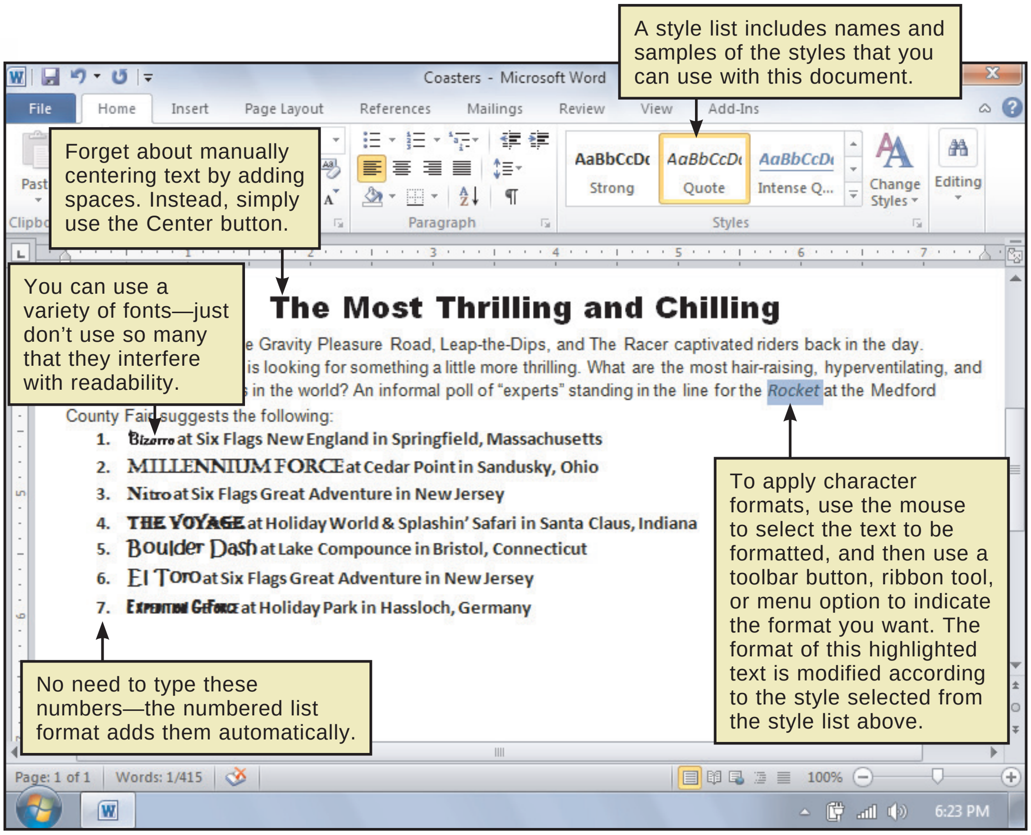
You can format one or more characters in a document to change text colors, fonts, and sizes. The term **font** refers to the design or typeface of each text character. Font size is measured in points (pt), with 10 pt being a typical size for text in the body of a document. You can apply additional character formats, such as bold, italics, and underlining. To apply character formats, use the mouse to select the text to be formatted, then use a toolbar button, ribbon tool, or menu option to indicate the format you want.

Paragraph format options include margin settings, line spacing, bulleted and numbered lists, columns, centering, left and right alignment, and "justification" that creates blocks of text evenly aligned on both the right and left sides. To apply paragraph formats, make sure that you're working within the paragraph, and then use a menu option to select a format.

A **style** is a set of character and paragraph attributes that you can define and name. For example, you might name a style "Section Heading" and define it as 14-point, bold, Arial font, single-spaced, and left-aligned. Your word processor typically keeps track of the styles you define in a style list. Once you have defined a style, you can apply all of its attributes in one operation by making a selection from the style list. Formats and styles can be applied to selected characters or to entire paragraphs. Click the Try It! button for a tour of basic formatting.

Try It!

Figure 10-2



A style list includes names and samples of the styles that you can use with this document.

Forget about manually centering text by adding spaces. Instead, simply use the Center button.

You can use a variety of fonts—just don't use so many that they interfere with readability.

The Most Thrilling and Chilling

e Gravity Pleasure Road, Leap-the-Dips, and The Racer captivated riders back in the day. is looking for something a little more thrilling. What are the most hair-raising, hyperventilating, and in the world? An informal poll of "experts" standing in the line for the *Rocket* at the Medford County Fair suggests the following:

1. Bizarro at Six Flags New England in Springfield, Massachusetts
2. MILLENNIUM FORCE at Cedar Point in Sandusky, Ohio
3. Nitro at Six Flags Great Adventure in New Jersey
4. THE VOYAGE at Holiday World & Splashin' Safari in Santa Claus, Indiana
5. Boulder Dash at Lake Compounce in Bristol, Connecticut
6. El Toro at Six Flags Great Adventure in New Jersey
7. Expedition GeForce at Holiday Park in Hassloch, Germany

To apply character formats, use the mouse to select the text to be formatted, and then use a toolbar button, ribbon tool, or menu option to indicate the format you want. The format of this highlighted text is modified according to the style selected from the style list above.

No need to type these numbers—the numbered list format adds them automatically.

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FAQ Does word processing software provide standard document styles?

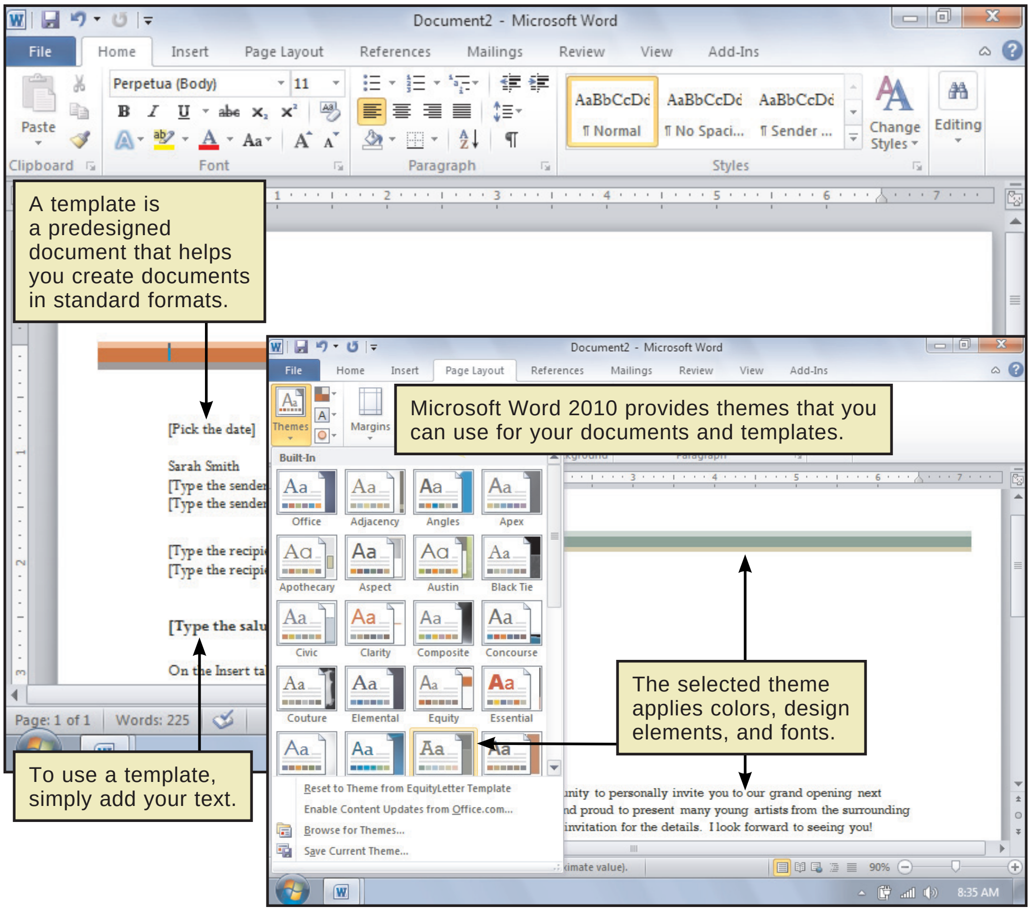
In addition to character and paragraph formatting options, word processing software also offers page format options that apply to an entire document. You can use page formats to add **header** text at the top of each page, add **footer** text at the bottom of each page, change the page size, and automatically number pages. You can also change the orientation of a document from **portrait**, in which the page is taller than it is wide, to **landscape**, which is wider than it is tall.

The overall look of a document depends on the combination of character, paragraph, and page formats you select. A collection of such settings is referred to as a **style sheet** (sometimes called a theme). You can save style sheets and themes that you create for a document so that you can create other documents with a similar look.

If you are unsure about the proper style to use for a document—such as a business memo—your word processing software might provide a predesigned **template** with appropriate headings, margin settings, and so on. Templates are also available online from software publishers and word processing Web sites. Using a template is easy. Simply open the template, type the text for your document, and apply styles as needed. Click the Try It! button for an overview of page formatting options, themes, and templates.

Try It!

Figure 10-3


Document2 - Microsoft Word
File
Home
Insert
Page Layout
References
Mailings
Review
View
Add-Ins
Paste
Clipboard
Perpetua (Body)
11
Font
Paragraph
¶ Normal
¶ No Spaci...
¶ Sender ...
Styles
Change Styles
Editing
Themes
Margins
Built-In
Office
Adjacency
Angles
Apex
Apothecary
Aspect
Austin
Black Tie
Civic
Clarity
Composite
Concourse
Couture
Elemental
Equity
Essential
Reset to Theme from EquityLetter Template
Enable Content Updates from Office.com...
Browse for Themes...
Save Current Theme...
[Pick the date]
Sarah Smith
Page: 1 of 1
Words: 225
90%
8:35 AM

A template is a predesigned document that helps you create documents in standard formats.

Microsoft Word 2010 provides themes that you can use for your documents and templates.

The selected theme applies colors, design elements, and fonts.

To use a template, simply add your text.

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FAQ What's desktop publishing software?

Desktop publishing software, sometimes called DTP software, provides tools to design and print typeset-quality documents using your PC. It is the software of choice for documents that will be widely distributed, such as newsletters, books, brochures, and corporate reports. Popular DTP software includes Adobe InDesign, Microsoft Publisher, QuarkXPress, and open-source Scribus.

Typically, DTP software is not the tool that you use to author and edit a document. Instead, you use it to collect and incorporate all the elements for a publication. For example, you would write, edit, and check the spelling of a document using word processing software, then import that text into your DTP software. You would also prepare photos using graphics software, and then import them as well.

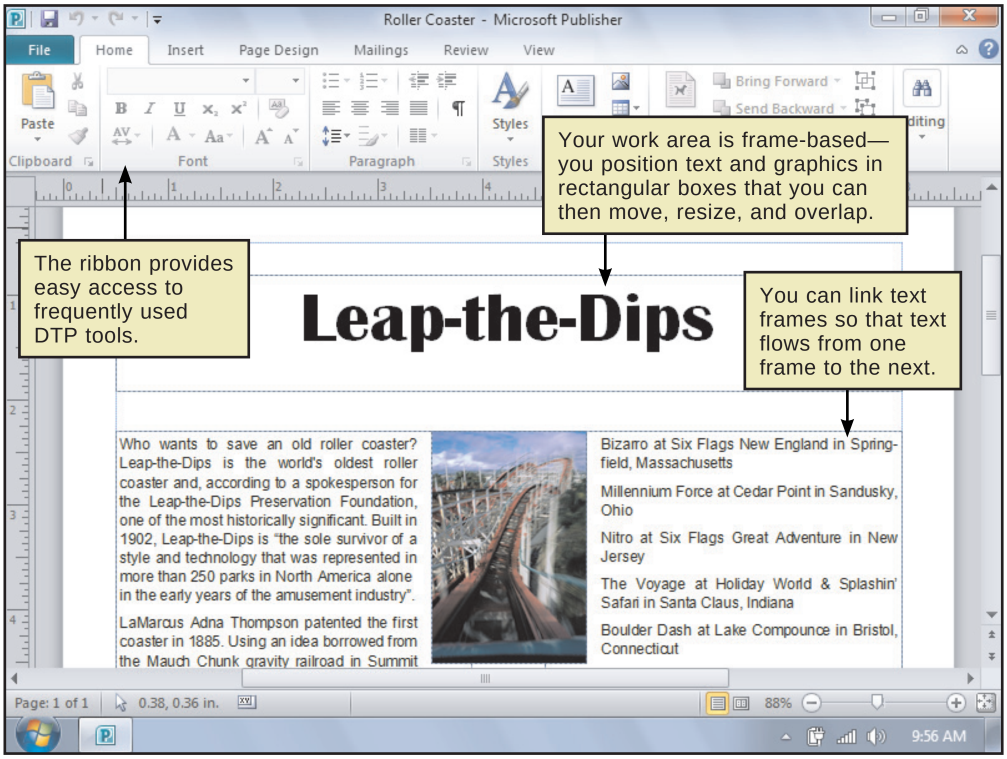
DTP software's major advantage is the flexibility and precision it provides for positioning text and graphical elements on a page. You can designate rectangular areas on the page called **frames** and fill each one with text or graphics. To achieve a pleasing layout, you can move, resize, and overlap these frames.

Another advantage of DTP software is the ability to link frames so that text flows seamlessly from one frame to another. For example, suppose you are laying out a newspaper-style publication. You can begin a story in a textbox on page 1 and then create a link to a box on page 5 to hold the rest of the story.

The appearance of your printed document depends on the quality of your printer and paper. If your computer printer cannot produce high-quality output, you might use it only to print drafts of your document. For the final printout, you can deliver your files to a professional printing service.

DTP software has essentially replaced typesetting, even for glossy magazines, newspapers, and books. Click the Try It! button to take a tour of DTP software.

Try It!



Leap-the-Dips

Who wants to save an old roller coaster? Leap-the-Dips is the world's oldest roller coaster and, according to a spokesperson for the Leap-the-Dips Preservation Foundation, one of the most historically significant. Built in 1902, Leap-the-Dips is "the sole survivor of a style and technology that was represented in more than 250 parks in North America alone in the early years of the amusement industry".

LaMarcus Adna Thompson patented the first coaster in 1885. Using an idea borrowed from the Mauch Chunk gravity railroad in Summit

Bizarro at Six Flags New England in Springfield, Massachusetts

Millennium Force at Cedar Point in Sandusky, Ohio

Nitro at Six Flags Great Adventure in New Jersey

The Voyage at Holiday World & Splashin' Safari in Santa Claus, Indiana

Boulder Dash at Lake Compounce in Bristol, Connecticut

The ribbon provides easy access to frequently used DTP tools.

Your work area is frame-based—you position text and graphics in rectangular boxes that you can then move, resize, and overlap.

You can link text frames so that text flows from one frame to the next.

Figure 10-4

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FAQ Do I need DTP software?

As a rule of thumb, you can probably create most of your documents using word processing software. You might consider installing desktop publishing software on your computer if you frequently produce graphics-intensive brochures, magazines, and newsletters, or professionally printed books.

Today's word processing software has evolved far beyond typewriter emulation and now incorporates many DTP features. Therefore, the capabilities of word processing and DTP software overlap to some extent. The difference between these two types of software is often one of degree. For example, although word processing software can work with color graphics, DTP software provides more flexibility for positioning, modifying, labeling, and adjusting the color of those graphics. You can send documents produced with word processing software to a professional print shop, but you might find that more print shops can accommodate files created with DTP software.

After you have worked with both word processing and DTP software, you will be better able to judge which one is appropriate for a particular project. In the meantime, don't hesitate to start by using word processing software for any project. If layout and formatting become too complex for your word processing software, you can easily import the document into DTP software, then lay it out and format it. Use the chart in Figure 10-5 to compare the strengths and weaknesses of word processing and DTP software to see whether you need both.

Figure 10-5

Document Production Feature	WP	DTP
Create outlines and autonumbered paragraphs	☺	☹
Check grammar	☺	☹
Track revisions made by authors and editors	☺	☹
Generate footnotes	☺	☹
Generate an index or table of contents	☺	😐
Check spelling	☺	☺
Generate tables	☺	☺
Work with columns of text	😐	😐
Control spacing between letters and lines for typeset look	😐	☺
Incorporate and manipulate graphics	😐	☺
Add callouts or text labels to graphics	☹	☺
Incorporate elaborate page headers	☹	☺
Generate full-color "plates" for a professional printer	☹	☺

☺ strong 😐 adequate ☹ weak

Hardware

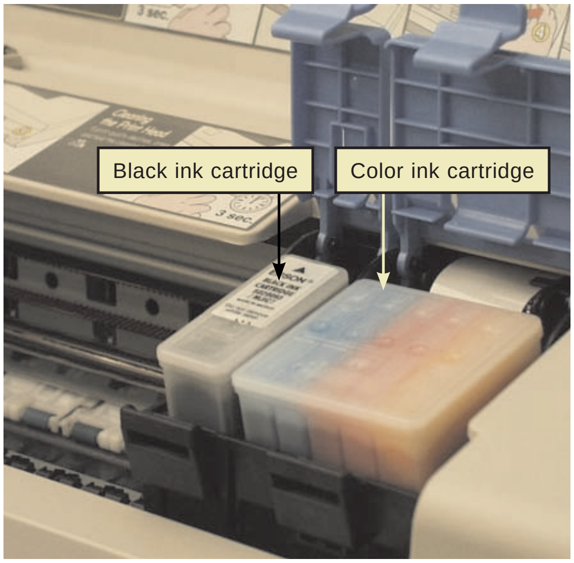
Printers

A **printer** is a device that converts computer output into images on sheets of paper or other media, such as labels, envelopes, transparencies, and iron-on transfers. Most of today's printers use ink-jet or laser technology and many popular models are multifunction printers that incorporate copy, scanning, faxing, and printing functions into a single unit.

Printer technologies produce characters and graphics as a series of small dots. The quality of a printout depends on its **print resolution**—the density of the gridwork of dots that form the image. Print resolution is measured by the number of dots printed per linear inch, abbreviated as dpi. At normal reading distance, a resolution of about 900 dots per inch appears solid to the human eye, but a close examination of color sections on a page will reveal the dot pattern. Although 900 dpi might be considered sufficient for magazines, expensive coffee-table books are typically produced on printers with 2,400 dpi or higher resolution.

An **ink jet printer** has a nozzle-like print head that sprays ink onto paper to form characters and graphics. Considered today's most popular printer technology, ink jets produce low-cost, black-and-white or color printouts. These printers also work well for outputting digital photos onto photo-quality paper that you can purchase at most office stores.

Figure 10-6



The print head in a color ink jet printer consists of a series of nozzles, one for each print color. Most ink jet printers use **CMYK color**, which requires only **c**yan (blue), **m**agenta (pink), **y**ellow, and blac**k** inks to create a printout that appears to have thousands of colors. Alternatively, some printers use six ink colors to print additional midtone shades that create slightly more realistic photographic images.

Operating costs for an ink jet printer are reasonable. You'll need to periodically replace the black ink and colored ink cartridges. You can reduce costs somewhat and help the environment by refilling your empty ink cartridges. Your local office or electronics store is likely to have an ink refill station, or you can send your empty cartridges to a mail-order refill depot.

Today's ink jet printers have excellent resolution; depending on the model, resolution can range from 600 dpi to 2,400 dpi. You can expect to pay more for a printer with a higher resolution in order to get better quality when printing photographic images. Some ink jet printers achieve their ultra-high resolution by making multiple passes over the paper. Although it might seem logical that this technique would slow down the printing process, even multiple-pass ink jet printers produce a respectable 12 pages per minute.

You can purchase a good-quality ink jet printer for less than US$100. Manufacturers include Hewlett-Packard, Epson, Lexmark, Dell, Canon, and NEC.

Hardware
(continued)

A **laser printer** uses the same technology as a photocopier to “paint” dots of light on a light-sensitive drum. Electrostatically charged ink is applied to the drum and then transferred to paper. You can purchase laser printers at two price points. Inexpensive desktop or personal models, priced under US$200, are quite suitable for black-and-white printing of a limited number of copies. More expensive professional laser printers with color or extended-run capacity begin at US$700 and quickly exceed the US$3,000 mark.

As with other printer technologies, print speed and resolution will be key factors in your purchase decision. Personal laser printers produce 10 to 20 pages per minute at a resolution of 600 dpi. Professional models pump out 19 to 40 pages per minute at 1,200 dpi. The **duty cycle** of a printer is specified in pages per month and indicates how many pages you can expect your printer to produce without breaking down. A personal laser printer has a duty cycle of about 3,000 pages per month—that means about 100 pages a day. You won’t want to use it to produce 5,000 campaign brochures for next Monday, but would find it quite suitable for printing ten copies of a five-page outline for a meeting tomorrow.

Some people are surprised to discover that laser printers are less expensive to operate than ink jet printers. On average, you can expect to pay about three cents per page for black-and-white laser printing. This per-page cost includes periodically replacing the toner cartridge and drum. A toner cartridge and a drum unit each cost about US$70, though prices vary by manufacturer and model.

Laser printers accept print commands from a PC, but use their own printer language to construct a page before printing it. **Printer Control Language** (PCL) is the most widely used printer language, but some printers also use the **PostScript** language, which is preferred by many publishing professionals.

Printer languages require memory, and most lasers have between 2 and 32 MB. A large memory capacity is required to print color images and graphics-intensive documents. A laser printer comes equipped with enough memory for typical print jobs. If you find that you need more memory, check the printer documentation for information. Click the Play It! button to take a tour of a laser printer and see how it works.

PlayIt!

Figure 10-7

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Hardware
(continued)

When PCs first began to appear in the late 1970s, dot matrix printers were the technology of choice. Still in use today, a **dot matrix printer** produces characters and graphics by using a matrix of fine wires. As the print head noisily clatters across the paper, the wires strike the ribbon and paper in a pattern prescribed by your PC. With a resolution of 360 dpi, a dot matrix printer produces low-quality output with clearly discernible dots forming letters and graphics. Dot matrix speed is typically measured in characters per second (cps). A fast dot matrix device can print at speeds up to 600 cps—about six pages per minute.

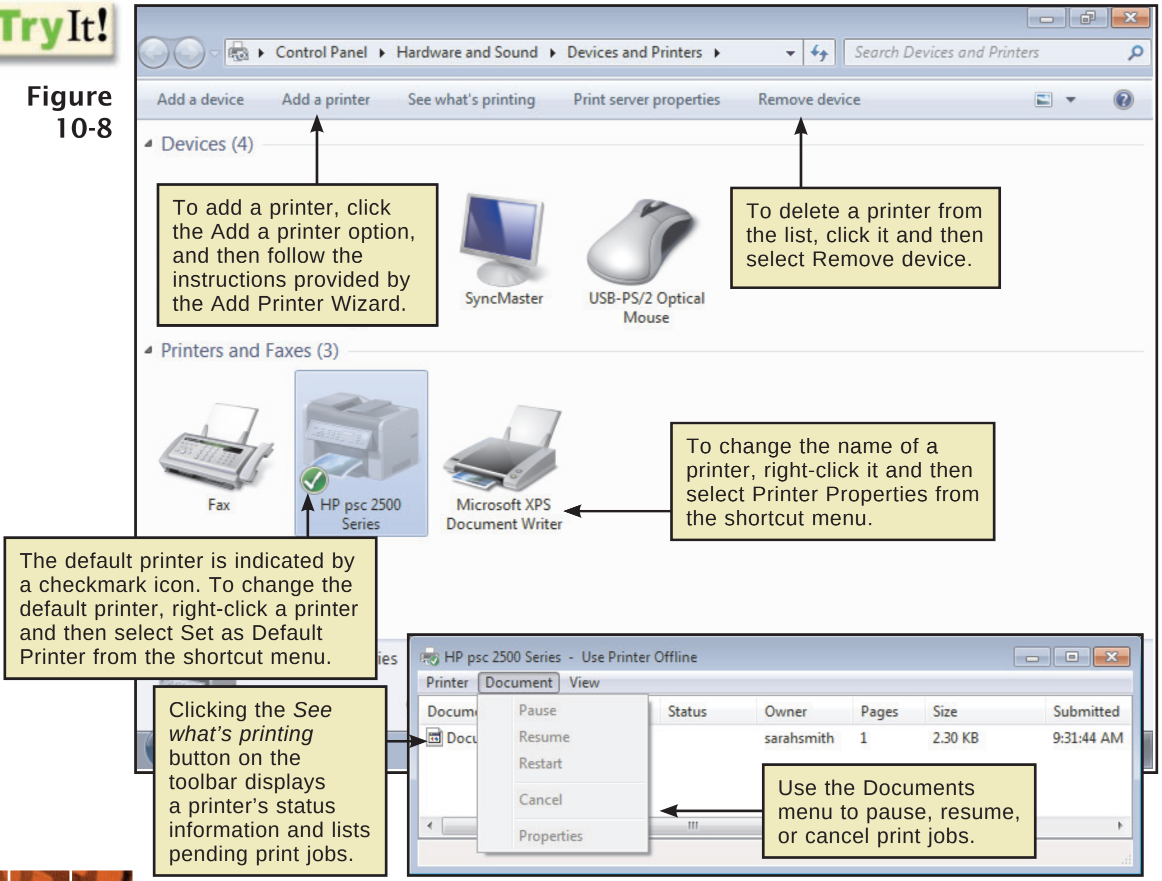
Unlike many newer printer technologies, a dot matrix printer actually strikes the paper and therefore can print multipart carbon forms. Today, dot matrix printers, which are sometimes referred to as impact printers, are used primarily for back-office applications that demand low operating cost and dependability, but not high print quality.

Regardless of the type of printer you use, it has to be properly installed so that it operates correctly. The first step of the installation process is easy. Simply plug the power cord into a wall outlet and plug the USB cable into your computer. Most printers can also be installed on network servers, and some printers can be directly connected to network routers to provide printing services to multiple computers.

Windows includes driver software for many printers. Most printers are shipped with a CD containing driver software, and drivers can be downloaded from the manufacturer's Web site. It is possible to have access to more than one printer, in which case you have to designate one printer as the default. The **default printer** will be used for day-to-day print jobs. You can use the Start menu's Devices and Printers button to change the default printer and check the status of print jobs. Click the Try It! button to learn how.

Try It!

Figure 10-8


Control Panel ▸ Hardware and Sound ▸ Devices and Printers ▸
Search Devices and Printers
Add a device
Add a printer
See what's printing
Print server properties
Remove device
Devices (4)
SyncMaster
USB-PS/2 Optical Mouse
Printers and Faxes (3)
Fax
HP psc 2500 Series
Microsoft XPS Document Writer
HP psc 2500 Series - Use Printer Offline
Printer
Document
View
Pause
Resume
Restart
Cancel
Properties
Docum
Status
Owner
Pages
Size
Submitted
Docu
sarahsmith
1
2.30 KB
9:31:44 AM

To add a printer, click the Add a printer option, and then follow the instructions provided by the Add Printer Wizard.

To delete a printer from the list, click it and then select Remove device.

To change the name of a printer, right-click it and then select Printer Properties from the shortcut menu.

The default printer is indicated by a checkmark icon. To change the default printer, right-click a printer and then select Set as Default Printer from the shortcut menu.

Clicking the *See what's printing* button on the toolbar displays a printer's status information and lists pending print jobs.

Use the Documents menu to pause, resume, or cancel print jobs.

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Project

Explore word processing software

Word processing software has proven invaluable in creating all types of documents. This chapter showed you that not only is word processing software useful for formatting your documents, but its special tools can actually help enhance your writing. Desktop publishing software was also discussed and selecting the right printer to produce first-rate output was emphasized.

When you have completed the project, you should be able to:

- Use templates to create documents.
- Apply formatting options to your documents.
- Use a spelling checker.

Requirements: This project requires Microsoft Windows 7, a browser, and Microsoft Office Word or any other word processor.

Deliverables:

1 A fax document containing the following:

   a. a completed cover sheet

   b. a letter to your guest speaker providing details of the talk

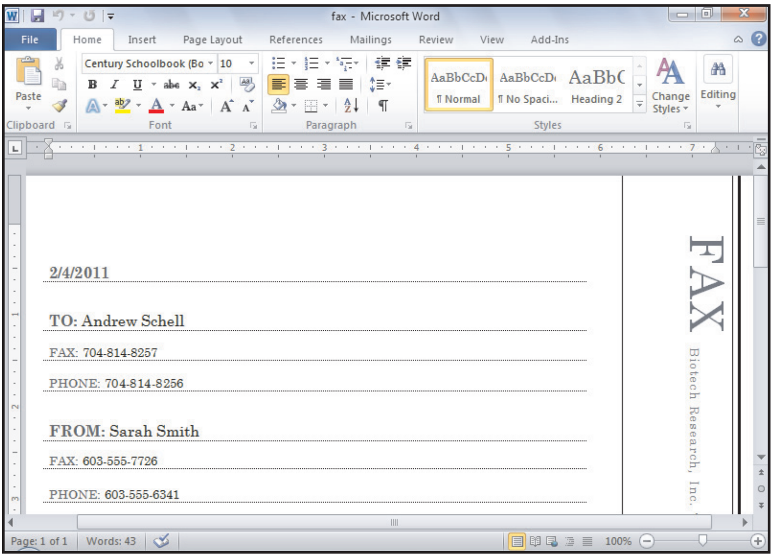
   c. a map to the seminar location

1. Imagine that a celebrity or field expert has agreed to be the guest speaker at your seminar. This person has requested a fax containing details about the seminar date, time, and location. To use your word processing software's fax template, follow the steps below:

   a. For Microsoft Word 2010, click the File tab in the upper-left corner of the Word window and select New. Under Home, click *Sample templates,* select a fax template, and click the Create button.

   If you're using an earlier version of Microsoft Word, click the File menu and select New. The New Document task pane is displayed. Under Templates, select *On my computer*. Click the Letters and Faxes tab in the Templates dialog box and select a fax template.

When the fax template appears, address it to Andrew Schell as shown and then complete the header with your name, address, and phone number.



2/4/2011

TO: Andrew Schell

FAX: 704-814-8257

PHONE: 704-814-8256

FROM: Sarah Smith

FAX: 603-555-7726

PHONE: 603-555-6341

FAX

Biotech Research, Inc.

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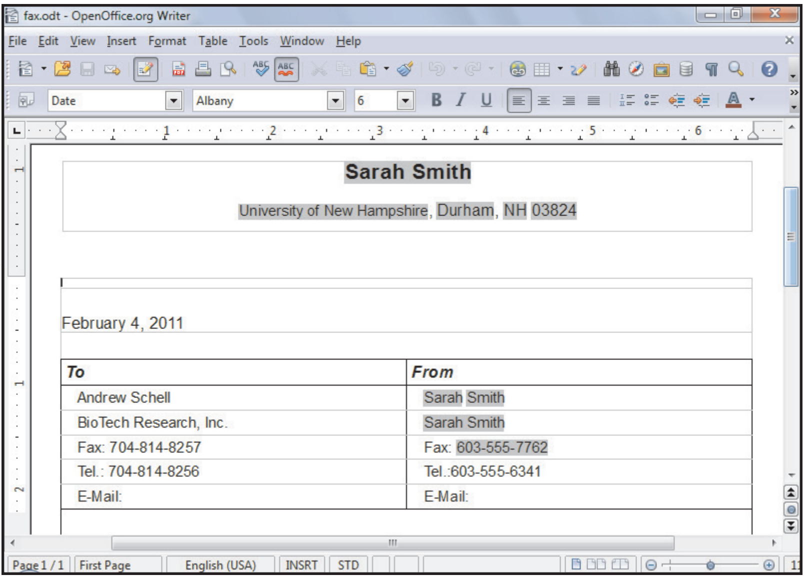
• Explore word processing software (continued)

b. If you are using OpenOffice Writer, click the File menu, select Wizards, and then click Fax. When the Fax Wizard opens, select Business Fax with the Classic Fax design and click the Next button. For *Items to include*, uncheck *Logo*, *Type of message*, and *Footer*, then select *Dear Sir or Madam* for the salutation. Click the Next button. For *Sender and Recipient*, click *New return address* and enter your name, address, and fax number (make one up if necessary). Click *Use placeholders for the recipient's address*. Click the Next button. Enter **Fax Cover Sheet** for the Template Name, click *Create a fax from the template*, and click Finish. When the fax template is displayed, fill in the rest of the information as shown below.


fax.odt - OpenOffice.org Writer
File Edit View Insert Format Table Tools Window Help
Date
Albany
6
Page 1 / 1
First Page
English (USA)
INSRT
STD

The fax template you create with OpenOffice Writer's Fax Wizard should look similar to this example, but with your name, address, and phone number in the From fields.

Sarah Smith

University of New Hampshire, Durham, NH 03824

February 4, 2011

To	*From*
Andrew Schell	Sarah Smith
BioTech Research, Inc.	Sarah Smith
Fax: 704-814-8257	Fax: 603-555-7762
Tel.: 704-814-8256	Tel.:603-555-6341
E-Mail:	E-Mail:

c. For all other word processors, click the Help menu or button to find out about templates. If your word processor does not provide fax templates or a fax wizard, type a simple header section similar to the example above and fill in the information with sample data.

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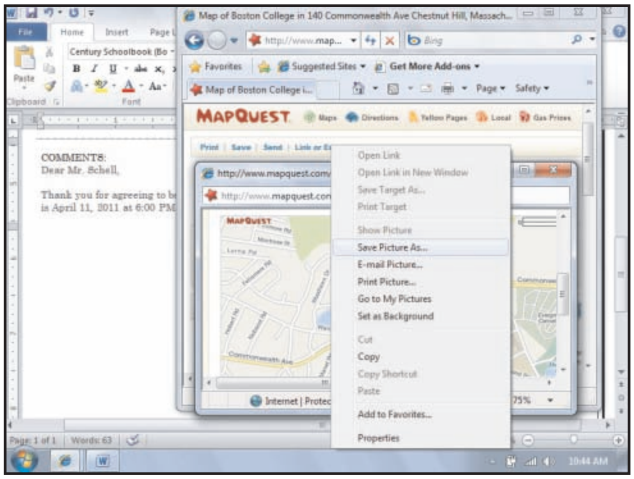
• Explore word processing software (continued)

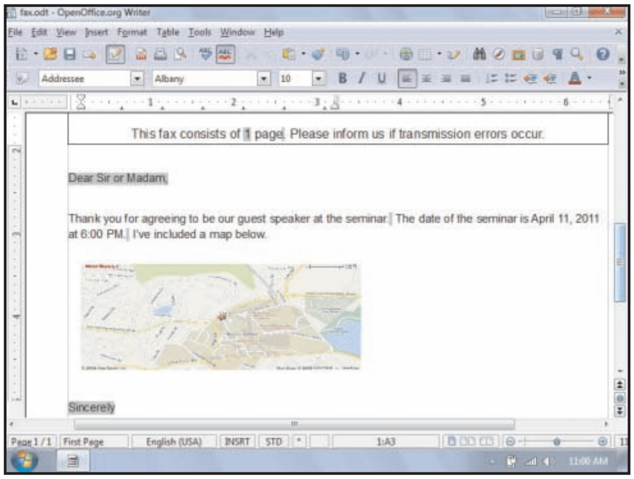
2. For the body of the fax, provide your guest speaker with the date and time of the seminar. Indicate that a map is included.

3. Next you will use MapQuest to provide the guest speaker with a map to the location of the seminar. Open your browser and navigate to the Web site www.mapquest.com. Use MapQuest to locate your school. Click the Print link at the top of the Web page. Right-click the map, then click Save Picture As. Save the picture in your Pictures Library. Close your browser.


Map of Boston College in 140 Commonwealth Ave Chestnut Hill, Massach...
File
Home
Insert
Page L
Century Schoolbook (Bo
Paste
Clipboard
Font
Favorites
Suggested Sites
Get More Add-ons
Map of Boston College i...
Page
Safety
MAPQUEST
Maps
Directions
Yellow Pages
Local
Gas Prices
Print
Save
Send
Link or E
http://www.mapquest.com
Open Link
Open Link in New Window
Save Target As...
Print Target
Show Picture
Save Picture As...
E-mail Picture...
Print Picture...
Go to My Pictures
Set as Background
Cut
Copy
Copy Shortcut
Paste
Add to Favorites...
Properties
Internet | Protec
75%
Page: 1 of 1
Words: 63
10:44 AM

COMMENTS:
Dear Mr. Schell,
Thank you for agreeing to b
is April 11, 2011 at 6:00 PM

4. Position the insertion point below the previous text in your fax. With Microsoft Word, click the Picture button on the Insert tab. Navigate to the location of the MapQuest map, select the picture, then click the Insert button. With OpenOffice Writer, click Insert on the menu bar, click Picture, then click From File. Navigate to the location of the MapQuest map, select it, then click the Open button. Resize the map as necessary so the fax fits on one page. For other word processors, access Help regarding inserting pictures.


fax.odt - OpenOffice.org Writer
File
Edit
View
Insert
Format
Table
Tools
Window
Help
Addressee
Albany
10
Page 1 / 1
First Page
English (USA)
INSRT
STD
11:00 AM

This fax consists of 1 page. Please inform us if transmission errors occur.

Dear Sir or Madam,

Thank you for agreeing to be our guest speaker at the seminar. The date of the seminar is April 11, 2011 at 6:00 PM. I've included a map below.

Sincerely

5. At the end of your letter, use the Times New Roman font for your signature. Click the Italic button to italicize your name.

6. Check spelling, then use the File menu or File tab to save the document in your My Documents folder as **Project 10 [Your Name]**. Close the word processor window.

7. Submit your document as a file, e-mail attachment, or printout according to your instructor's preference.

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Issue

What's truth got to do with it?

You live in the Information Age. Ironically, much of the information that you read and hear is just not true. False and misleading information predates the Information Age, but now it propagates more rapidly, fed by new technologies and nurtured by spin doctors. As one commentator has suggested, "The danger is that we are reaching a moment when nothing can be said to be objectively true, when consensus about reality disappears. The Information Age could leave us with no information at all, only assertions."

In a more innocent era, the source of information provided a clue about its reliability. Television network news was usually dependable. You could generally rely on newspaper reports and information in books. Now, however, the yardstick once used to measure the reliability of information is being challenged by technology and by changes in the relationship between mass media and their audience.

Using DTP software, virtually anyone can produce brochures, pamphlets, and books that look professional and official. Using Web authoring software, it is easy to design a professional Web site and stock it with misinformation. In an Internet chat group, anyone can start a rumor that propagates via the Net and eventually achieves the status of an urban legend. Editorializing has softened hard news, and news stories are often selected for their sensationalism, rather than for their importance.

Who should be responsible for ensuring the accuracy of information? Holding writers accountable for their "facts" does not seem to be working. Governments, already overburdened with other problems, have scant resources available to sift through mountains of information and set the record straight. It seems, then, that the burden of verifying facts is ultimately left to the reader—or watcher, as the case may be. But individuals often do not have the time, motivation, expertise, or resources to verify facts before they pass them on through the information mill.

Luxuries come at a price. Along with the benefits of quick access to breaking news, videos, e-mail, social networking sites, Twitter, and other innovations of the Information Age comes a responsibility for all of us to think, analyze, and verify the information we ultimately believe and pass on to others.

What do you think?

1. In your opinion, can people typically recognize false information in print, on the Web, or on TV? ○ Yes ○ No ○ Not sure

2. Have you believed information from a reliable source that you later discovered was false? ○ Yes ○ No ○ Not sure

3. Do you think that governments should penalize people who knowingly disseminate false information? ○ Yes ○ No ○ Not sure

Save It!

QuickCheck A

1. True or false? In the phrase “Goldilocks and the tree bears,” a spelling or grammar checker will flag the word “tree” because it is missing the letter “h.” ☐
2. When you initially type the raw text for a document, you should press the Enter key only at the end of a title, bullet point, or ☐ .
3. A collection of settings for character, paragraph, and page formats is referred to as a style sheet or ☐ .
4. True or false? Word processing software was designed to produce documents that look professionally typeset. ☐
5. DTP software uses rectangular ☐ to hold text and graphics.

CheckIt!

QuickCheck B

In the right column of the table, indicate which type of printer would **best** fit the job. Abbreviate your answers, using **D** for dot matrix, **J** for ink jet, and **L** for laser.

1. An individual wants to print color photographic images of family and friends.	
2. A school secretary wants to print 300 copies of the black-and-white program for tomorrow’s school play.	
3. A salesperson needs to print out a multipart carbon invoice form.	
4. A publisher wants to specialize in full-color brochures.	
5. A student wants a dependable low-cost color printer.	

CheckIt!

GetIt?

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 10.

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CHAPTER 11

Working with Spreadsheets

What’s Inside?

Chapter 11 begins with a whirlwind tour of spreadsheet software, used for number crunching applications, such as balancing checkbooks, estimating construction costs, recording student grades, and creating graphs. The hardware topic for this chapter focuses on computer display devices and setting up an ergonomic work area to prevent physical stresses and strains from computer use.

- **FAQs:**
  - What’s a spreadsheet? 157
  - How do I create a worksheet? 158
  - What if I don’t know the right formula? 159
  - How do I know whether worksheet results are accurate? 160
  - How do I create graphs? 161
- **Hardware:** Display devices 162
- **Project:** Explore spreadsheet software 165
- **Issue:** Who’s to blame for faulty software? 168
- **QuickChecks** 169

What’s on the CD?

Chapter 11 animates spreadsheet software to show you how to create worksheets and graphs. In addition, you’ll find out how to change your computer’s screen resolution and configure your computer for two displays.

- Tour some of spreadsheet software’s nifty features 157
- Hear some helpful hints from spreadsheet veterans 158
- Learn how to incorporate functions in your worksheets 159
- Find out what can happen if you don’t test your worksheets 160
- Discover how to create useful charts 161
- Learn how to change screen resolution and configure two displays 163

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FAQ What's a spreadsheet?

A **spreadsheet** is a tool for working with numbers. It is arranged in a grid of columns and rows forming cells that hold labels, numbers, and formulas. You can use spreadsheets for simple or complex calculations, such as computing loan payments, figuring out your taxes, or dividing expenses with your roommates.

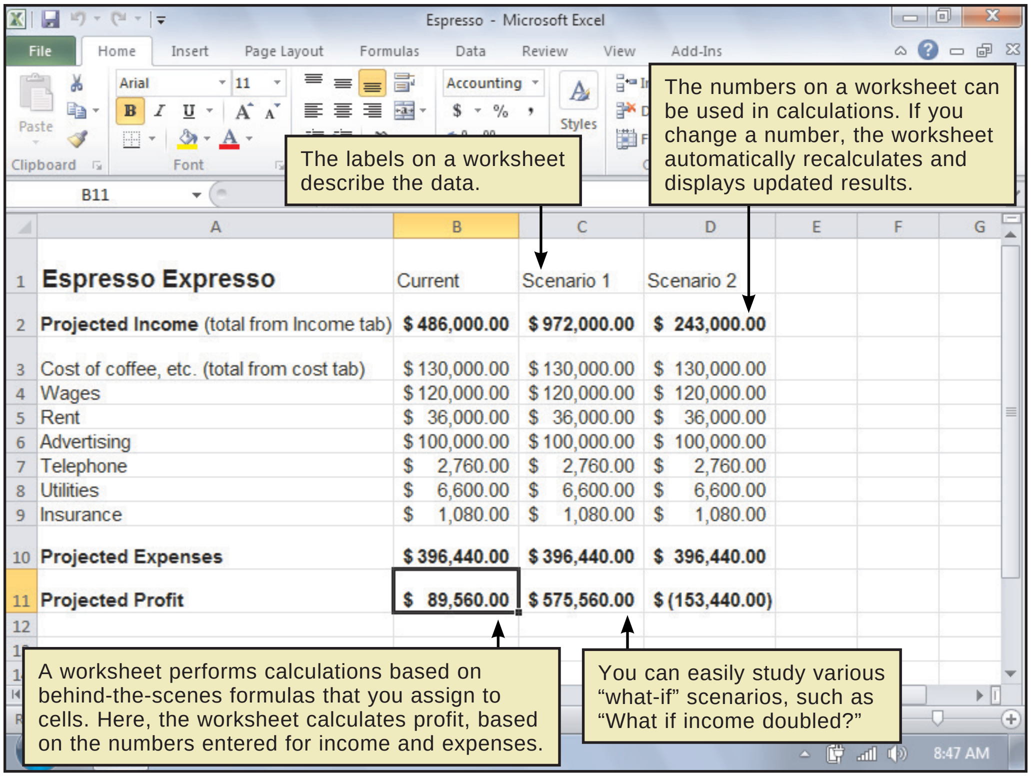
Spreadsheet software, such as Microsoft Excel, OpenOffice Calc, and Lotus 1-2-3, allows you to create electronic spreadsheets that you can easily edit, print, save, post on the Web, or transmit via e-mail. An electronic spreadsheet is often referred to as a **worksheet**.

A worksheet functions much like a visual calculator. You place each number needed for a calculation in a **cell** of the grid. You can then enter formulas to add, subtract, or otherwise manipulate these numbers. Your worksheet automatically calculates the formulas and displays the results. As an added bonus, you can create graphs based on the data in a worksheet.

Using spreadsheet software helps ensure the accuracy of your calculations by displaying all of your data and formulas on screen. It can also help you to create numeric models of real-world entities. As an example, you could create a numeric model of a new business, then examine projected income and expenses to determine whether the business will make you rich beyond your wildest dreams. You can even use your model to examine several alternative **"what-if" scenarios**, such as "What if sales are double what I projected?" or "What if sales are only half of what I projected?" Click the Try It! button to take a tour of basic spreadsheet features.

Try It!

Figure 11-1



	A	B	C	D
1	**Espresso Expresso**	Current	Scenario 1	Scenario 2
2	**Projected Income** (total from Income tab)	**$ 486,000.00**	**$ 972,000.00**	**$ 243,000.00**
3	Cost of coffee, etc. (total from cost tab)	$ 130,000.00	$ 130,000.00	$ 130,000.00
4	Wages	$ 120,000.00	$ 120,000.00	$ 120,000.00
5	Rent	$ 36,000.00	$ 36,000.00	$ 36,000.00
6	Advertising	$ 100,000.00	$ 100,000.00	$ 100,000.00
7	Telephone	$ 2,760.00	$ 2,760.00	$ 2,760.00
8	Utilities	$ 6,600.00	$ 6,600.00	$ 6,600.00
9	Insurance	$ 1,080.00	$ 1,080.00	$ 1,080.00
10	**Projected Expenses**	**$ 396,440.00**	**$ 396,440.00**	**$ 396,440.00**
11	**Projected Profit**	**$ 89,560.00**	**$ 575,560.00**	**$ (153,440.00)**

The labels on a worksheet describe the data.

The numbers on a worksheet can be used in calculations. If you change a number, the worksheet automatically recalculates and displays updated results.

A worksheet performs calculations based on behind-the-scenes formulas that you assign to cells. Here, the worksheet calculates profit, based on the numbers entered for income and expenses.

You can easily study various "what-if" scenarios, such as "What if income doubled?"

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FAQ How do I create a worksheet?

When you have a clear idea of the purpose of your worksheet, you can begin by entering a title and **labels** that will identify your data. Next, you can enter the numbers, or **values**, that will be incorporated in calculations. Finally, you can enter formulas in any cells where you want the result of a calculation to appear.

A **formula** specifies how to add, subtract, multiply, or divide the numbers in worksheet cells. Typically, a formula begins with an equal sign (=) and contains cell references instead of the raw numbers for a calculation.

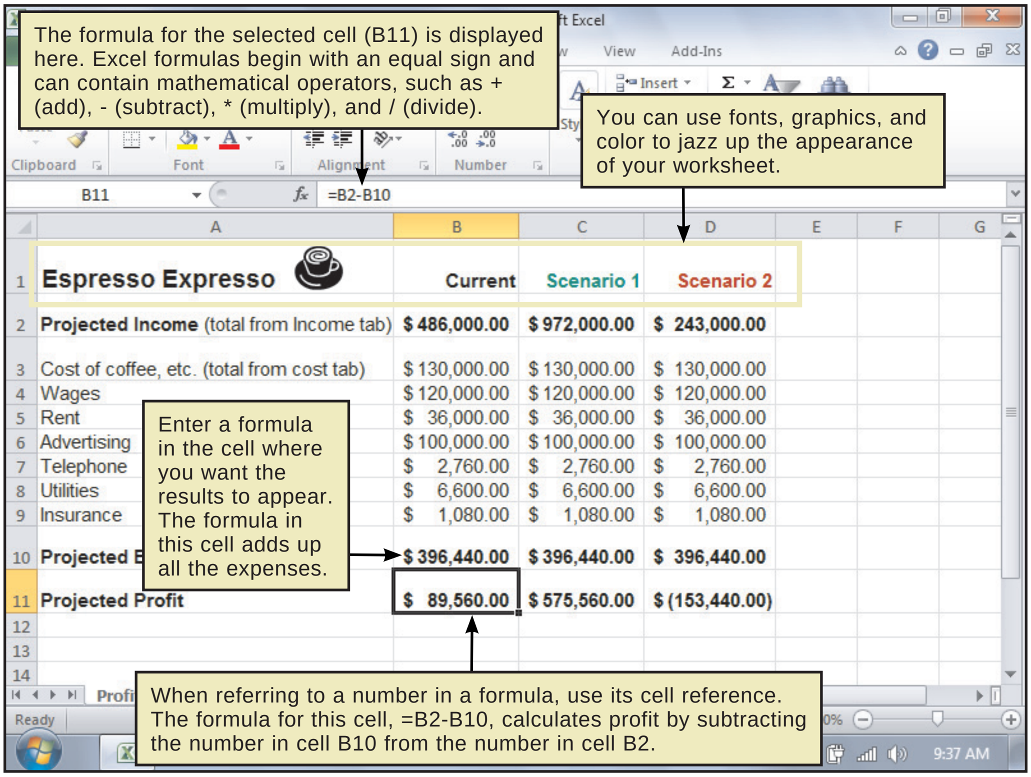
A **cell reference** is the column and row location of a cell. In Figure 11-2, the projected income of $486,000.00 is in column B and row 2, so its cell reference is B2. To create the formula that calculates profit (=B2-B10), you should use cell references instead of the actual numbers. Then, if the projected income changes, you can simply enter the new number in cell B2, but you won't have to change the formula. Spreadsheet software will recalculate the profit based on the new number you've entered.

After you've entered labels, numbers, and formulas, you can format your worksheet to make it more attractive and easier to understand. Formatting options include font treatments, cell colors, and data alignment within the cells. An additional set of formatting options helps you control the way your numbers are displayed, such as whether to include dollar signs, decimal places, and commas.

Seasoned worksheet veterans have developed tips and tricks for making effective worksheets. They'll share some of these ideas with you when you click the Try It! button.

Try It!

Figure 11-2



The formula for the selected cell (B11) is displayed here. Excel formulas begin with an equal sign and can contain mathematical operators, such as + (add), - (subtract), * (multiply), and / (divide).

You can use fonts, graphics, and color to jazz up the appearance of your worksheet.

B11 =B2-B10

	A	B	C	D
1	Espresso Expresso	Current	Scenario 1	Scenario 2
2	**Projected Income** (total from Income tab)	**$ 486,000.00**	**$ 972,000.00**	**$ 243,000.00**
3	Cost of coffee, etc. (total from cost tab)	$ 130,000.00	$ 130,000.00	$ 130,000.00
4	Wages	$ 120,000.00	$ 120,000.00	$ 120,000.00
5	Rent	$ 36,000.00	$ 36,000.00	$ 36,000.00
6	Advertising	$ 100,000.00	$ 100,000.00	$ 100,000.00
7	Telephone	$ 2,760.00	$ 2,760.00	$ 2,760.00
8	Utilities	$ 6,600.00	$ 6,600.00	$ 6,600.00
9	Insurance	$ 1,080.00	$ 1,080.00	$ 1,080.00
10	**Projected E**	**$ 396,440.00**	**$ 396,440.00**	**$ 396,440.00**
11	**Projected Profit**	**$ 89,560.00**	**$ 575,560.00**	**$ (153,440.00)**
12				
13				
14				

Enter a formula in the cell where you want the results to appear. The formula in this cell adds up all the expenses.

When referring to a number in a formula, use its cell reference. The formula for this cell, =B2-B10, calculates profit by subtracting the number in cell B10 from the number in cell B2.

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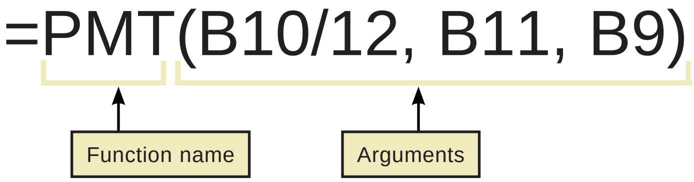
FAQ What if I don't know the right formula?

Some formulas are easy to figure out. If you follow baseball, you know that a player's batting average is the number of hits divided by the number of times at bat. Easy. But suppose that you're looking at new cars and you want to calculate your monthly payments for a spiffy red Honda. You'll need to factor in interest rates, the number of payments, and the cost of the car.

Spreadsheet software includes built-in functions. A **function** is a predefined formula that performs simple or complex calculations. Handy functions include AVERAGE, SUM, PMT (calculate monthly payments), STDEV (calculate a standard deviation), and ROUND (round off a decimal number).

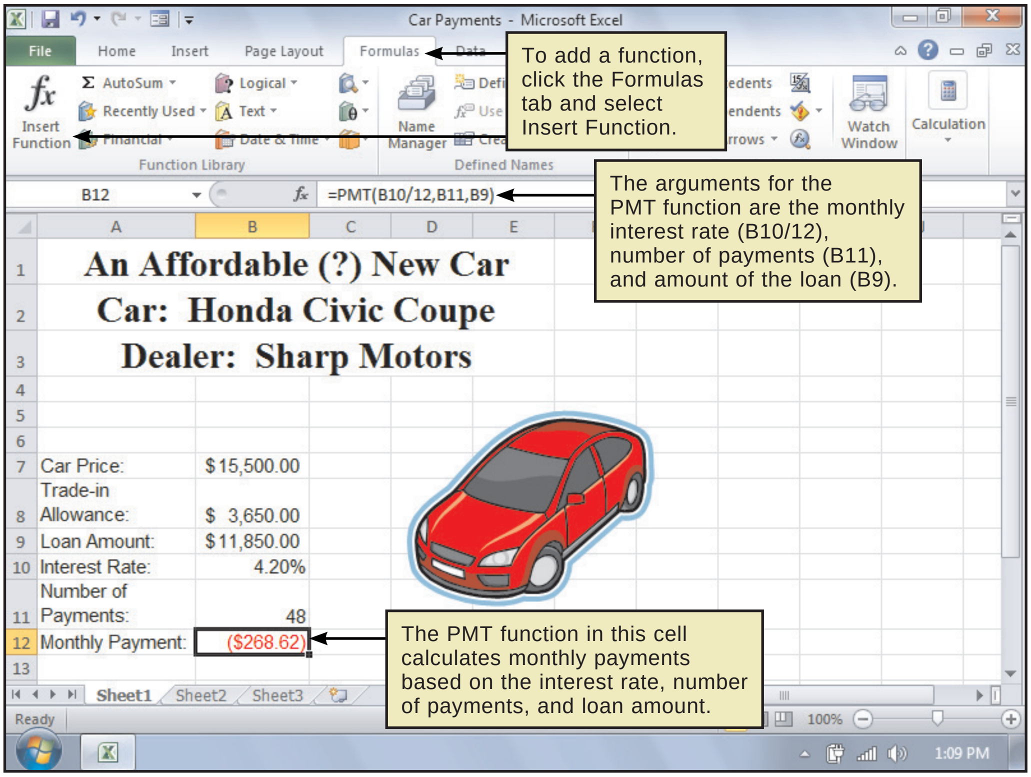
To use a function, simply select it from the function list, then follow the on-screen instructions to select the cells that contain arguments for the calculation. An **argument**, sometimes called a parameter, is a value or cell reference that a function uses as the basis for a calculation. When you use the PMT function to calculate monthly car payments, the arguments include the interest rate, number of payments, and cost of the car.

The arguments for a function are generally separated by commas and enclosed in parentheses. Click the Try It! button to explore worksheet functions and learn how to incorporate them into your worksheets.


=PMT(B10/12, B11, B9)
Function name
Arguments

Try It!

Figure 11-3


Car Payments - Microsoft Excel
File
Home
Insert
Page Layout
Formulas
Data
Insert Function
AutoSum
Recently Used
Financial
Logical
Text
Date & Time
Function Library
Name Manager
Defined Names
Watch Window
Calculation
Sheet1
Sheet2
Sheet3
Ready
100%
1:09 PM

To add a function, click the Formulas tab and select Insert Function.

B12 =PMT(B10/12,B11,B9)

The arguments for the PMT function are the monthly interest rate (B10/12), number of payments (B11), and amount of the loan (B9).

	A	B
1	An Affordable (?) New Car	
2	Car: Honda Civic Coupe	
3	Dealer: Sharp Motors	
4		
5		
6		
7	Car Price:	$15,500.00
8	Trade-in Allowance:	$ 3,650.00
9	Loan Amount:	$11,850.00
10	Interest Rate:	4.20%
11	Number of Payments:	48
12	Monthly Payment:	($268.62)
13		

The PMT function in this cell calculates monthly payments based on the interest rate, number of payments, and loan amount.

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FAQ How do I know whether worksheet results are accurate?

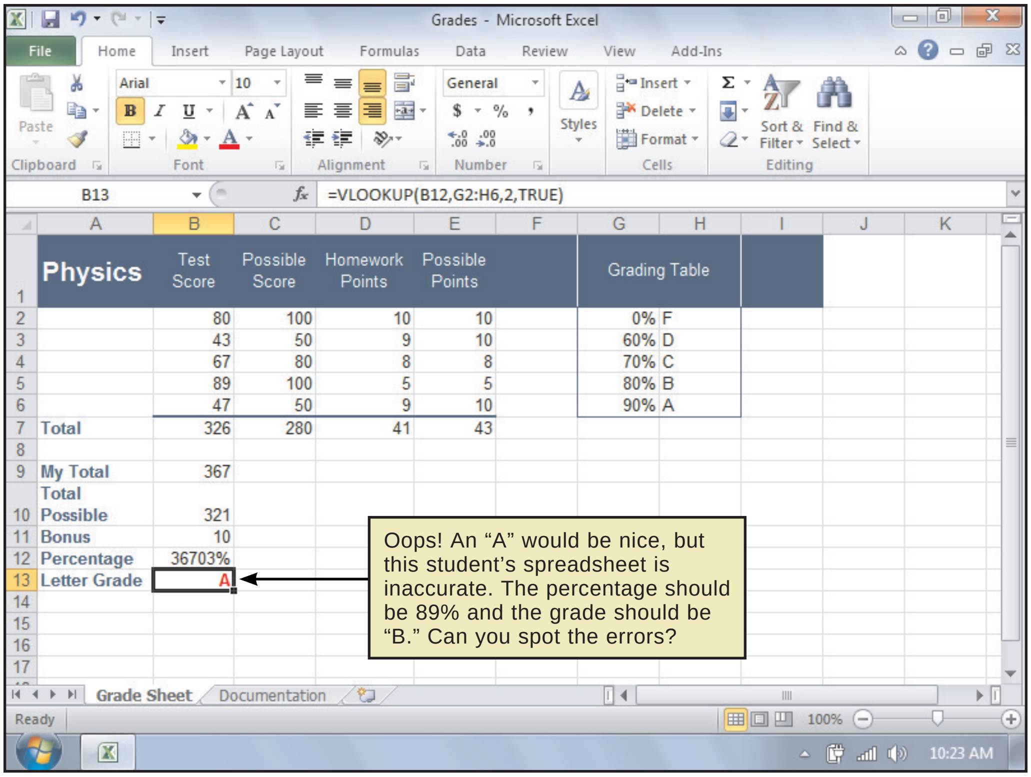
The person who creates a worksheet is responsible for its accuracy. Therefore, before you use or distribute a worksheet, you should test it to verify that it produces the correct results. Most spreadsheet software includes sophisticated tools for testing worksheets. If possible, however, you should first simply check the results using a handheld calculator on data that is known to be correct. Worksheet errors typically result from one of the following factors:

- A value that you entered in a cell is incorrect due to a typographical error.
- A formula contains a mathematical operator that is not correct, includes an incorrect cell reference, or is simply wrong.
- A formula produces the wrong results because the order for the calculations is not correct. Spreadsheet software first performs any operations in parentheses, then performs multiplication and division, and finally performs addition and subtraction. For example, the result of the formula =2+10/5 is 4, whereas the result of =(2+10)/5 is 2.4.
- A specified series of cells does not encompass all the values needed for a calculation. For example, you may have intended to add the values in cells C5 through H5, but specified cells C5 through G5.
- The worksheet was created using a built-in function, but the wrong cells were selected as the arguments. For example, in the PMT function, the first argument is supposed to be the interest rate. However, if the first argument has been assigned to the cell that contains the loan amount, the PMT function will produce the wrong result.

Click the Try It! button for tips on how to check the accuracy of your worksheets.

Try It!

Figure 11-4



B13 =VLOOKUP(B12,G2:H6,2,TRUE)

	A	B	C	D	E	F	G	H
1	Physics	Test Score	Possible Score	Homework Points	Possible Points		Grading Table	
2		80	100	10	10		0%	F
3		43	50	9	10		60%	D
4		67	80	8	8		70%	C
5		89	100	5	5		80%	B
6		47	50	9	10		90%	A
7	Total	326	280	41	43			
8								
9	My Total	367						
10	Total Possible	321						
11	Bonus	10						
12	Percentage	36703%						
13	Letter Grade	A						

Oops! An "A" would be nice, but this student's spreadsheet is inaccurate. The percentage should be 89% and the grade should be "B." Can you spot the errors?

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FAQ How do I create graphs?

Most spreadsheet software includes features that create graphs—sometimes called charts in spreadsheet terminology. A graph is based on the data in a worksheet. When you alter worksheet data, the graph automatically reflects the change.

Typically, you'll want to graph the data contained in one or more ranges. A **range** is a series of cells. For example, the range B3:B6 includes cells B3, B4, B5, and B6. The range for a graph is also referred to as a data set or data series. To create a graph comparing apple and grape production, one range of data would be apple production and the other would be grape production.

Your spreadsheet software allows you to create many types of graphs, such as bar, line, pie, column, scatter, area, doughnut, and high-low-close graphs. You can even add graphics to bar and column charts. For example, instead of a plain bar depicting fruit yield, you can stack up a series of apples on one set of bars and a series of grapes on the other set.

Creating a graph requires a few easy steps:

- Plan your chart by deciding which worksheet data you want to chart and the type of chart you want to use.
- Activate the Chart Wizard for step-by-step instructions on creating the chart.
- Use the Chart and formatting menu options to change the appearance of the chart labels, data markers, and dimensions.

Click Try It! to see how easily you can create graphs from spreadsheet data.

Try It!

Figure 11-5

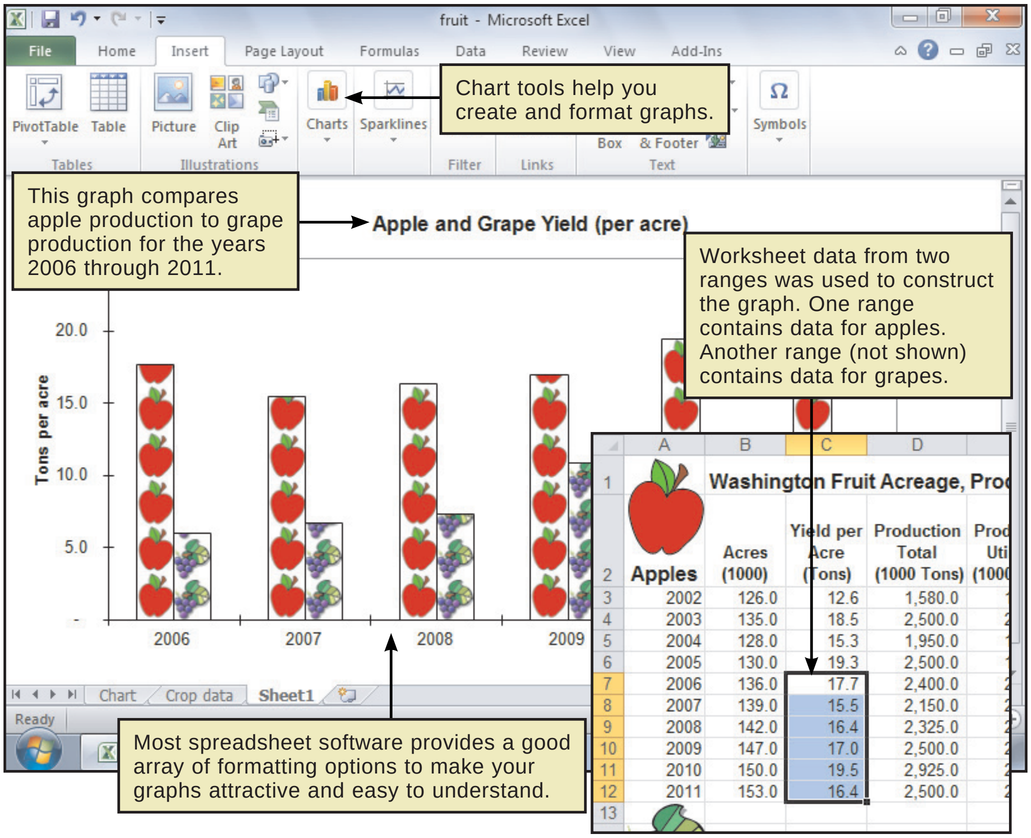
fruit - Microsoft Excel
File
Home
Insert
Page Layout
Formulas
Data
Review
View
Add-Ins
PivotTable
Table
Picture
Clip Art
Charts
Sparklines
Symbols
Box
& Footer
Tables
Illustrations
Filter
Links
Text
Apple and Grape Yield (per acre)
Tons per acre
20.0
15.0
10.0
5.0
-
2006
2007
2008
2009
Chart
Crop data
Sheet1
Ready

Chart tools help you create and format graphs.

This graph compares apple production to grape production for the years 2006 through 2011.

Worksheet data from two ranges was used to construct the graph. One range contains data for apples. Another range (not shown) contains data for grapes.

Most spreadsheet software provides a good array of formatting options to make your graphs attractive and easy to understand.

Washington Fruit Acreage, Pro

Apples	Acres (1000)	Yield per Acre (Tons)	Production Total (1000 Tons)
2002	126.0	12.6	1,580.0
2003	135.0	18.5	2,500.0
2004	128.0	15.3	1,950.0
2005	130.0	19.3	2,500.0
2006	136.0	17.7	2,400.0
2007	139.0	15.5	2,150.0
2008	142.0	16.4	2,325.0
2009	147.0	17.0	2,500.0
2010	150.0	19.5	2,925.0
2011	153.0	16.4	2,500.0

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Hardware

Display devices

A computer display device, sometimes referred to as a monitor, is usually classified as an output device because it shows the results of processing tasks. Touch-sensitive screens, however, can be classified as both input and output devices because they accept input and display output. Two technologies are commonly used for computer display devices: LCD and LED. These technologies replace heavy, bulky CRT (cathode ray tube) monitors that used the same technology as old-fashioned televisions.

Figure 11-6

An **LCD** (liquid crystal display) produces on-screen images by manipulating light within a layer of liquid crystal cells. Modern LCD technology is compact in size and lightweight, and provides an easy-to-read display. LCDs are standard equipment on notebook computers. Standalone LCDs, referred to as LCD monitors or flat panel displays, are popular for desktop computers. The advantages of LCD monitors include display clarity, low radiation emission, portability, and energy efficiency.

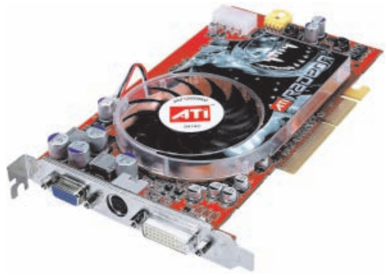
LED (light emitting diode) technology is used for computer displays in two ways. It is most commonly used as backlighting for standard LCD panels. Technically, devices with LED backlighting should be labeled “LED backlit LCD panels,” but many manufacturers advertise them as LEDs, so read the fine print. LEDs can also be used in place of the LCDs that form screen images. These true LED screens have a bright, crisp image and draw less power than LCDs.

In addition to the display device, a computer display system also requires graphics circuitry that generates signals for displaying images on the screen. One type of graphics circuitry, referred to as **integrated graphics**, is built into a computer’s system board. Graphics circuitry can also be supplied by a small circuit board called a graphics card, like the one in Figure 11-7.

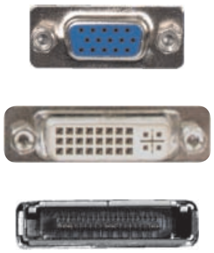
A **graphics card** (also called a graphics board or video card) typically contains a graphics processing unit and special video memory. A **graphics processing unit** (GPU) executes graphics commands leaving the main processor free for other tasks. **Video memory** stores screen images as they are processed but before they are displayed. A fast GPU and lots of video memory are the keys to lightning-fast screen updating for fast action games, 3D modeling, and graphics-intensive desktop publishing.

Monitors connect to computers using VGA, DVI, or HDMI ports. You can use these ports to connect a second monitor to your netbook, notebook, or desktop computer.

Figure 11-7



Graphics card



VGA, HDMI, and DVI ports

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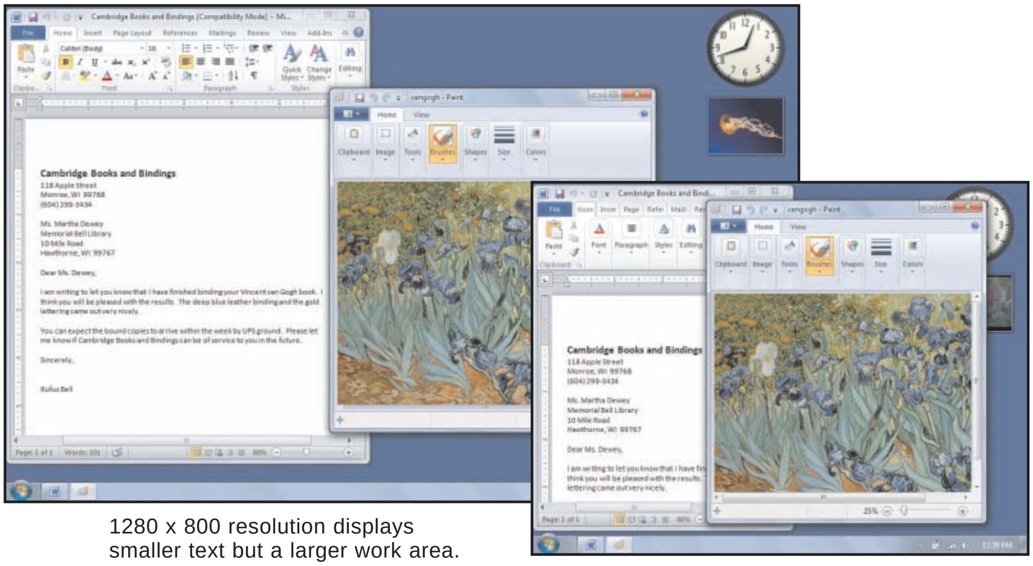
Hardware
(continued)

Each dot of light on a computer screen is called a **pixel**, short for picture element. The number of horizontal and vertical pixels that a device displays on screen is referred to as **screen resolution**. Today's 1080i and 1080p display devices typically have 1920 x 1080 resolution, which makes them compatible with HDTV standards, including the widescreen 16:9 aspect ratio.

At higher screen resolutions, text and other objects appear small, but the computer can display a large work area. At lower screen resolutions, text and objects appear larger, but the apparent work area is smaller. Figure 11-8 illustrates this difference.

Figure 11-8



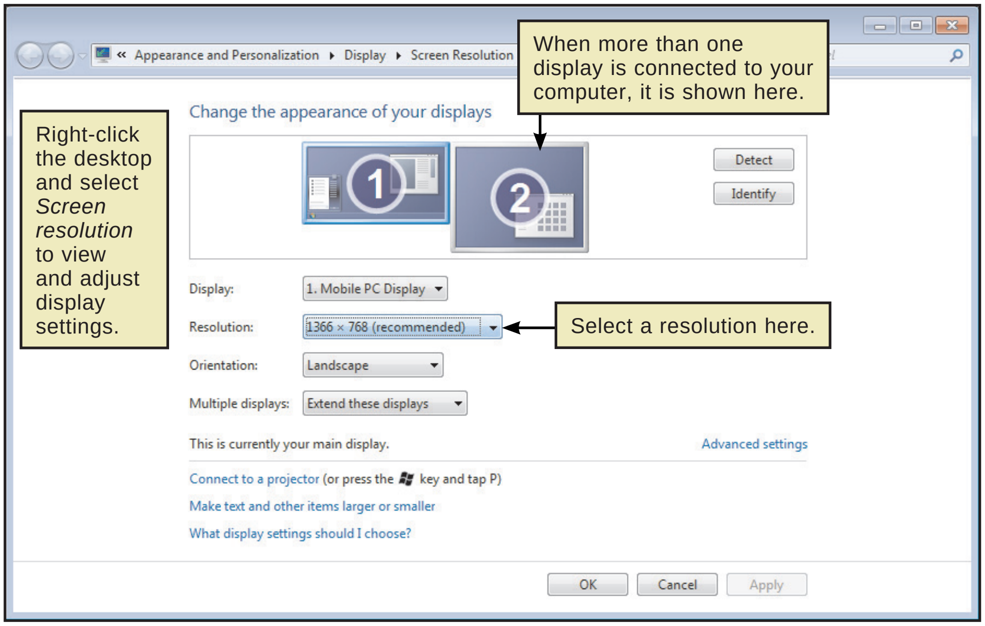
1280 x 800 resolution displays smaller text but a larger work area.

800 x 600 resolution displays larger text but a smaller work area.

As shown in Figure 11-9, you can change the resolution displayed on your computer screen up to the maximum resolution of your display device. Most displays have a recommended resolution at which images are clearest and text is crispest.

Try It!

Figure 11-9


« Appearance and Personalization ▸ Display ▸ Screen Resolution
Change the appearance of your displays
1
2
Detect
Identify
OK
Cancel
Apply

Right-click the desktop and select *Screen resolution* to view and adjust display settings.

When more than one display is connected to your computer, it is shown here.

Display: 1. Mobile PC Display

Resolution: 1366 × 768 (recommended)

Orientation: Landscape

Multiple displays: Extend these displays

Select a resolution here.

This is currently your main display.

Advanced settings

Connect to a projector (or press the ⊞ key and tap P)

Make text and other items larger or smaller

What display settings should I choose?

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Hardware
(continued)

Display devices are a key computer system component; their selection and placement affect the ergonomics of your work environment. **Ergonomics** is the science of configuring jobs, equipment, and workplaces with regard to worker health and safety. You can use ergonomic principles to set up your own work areas to minimize repetitive stress injuries, eye strain, and back pain.

When evaluating standalone monitors or notebook computer displays, you might want to check the following factors that contribute to ergonomic viewing:

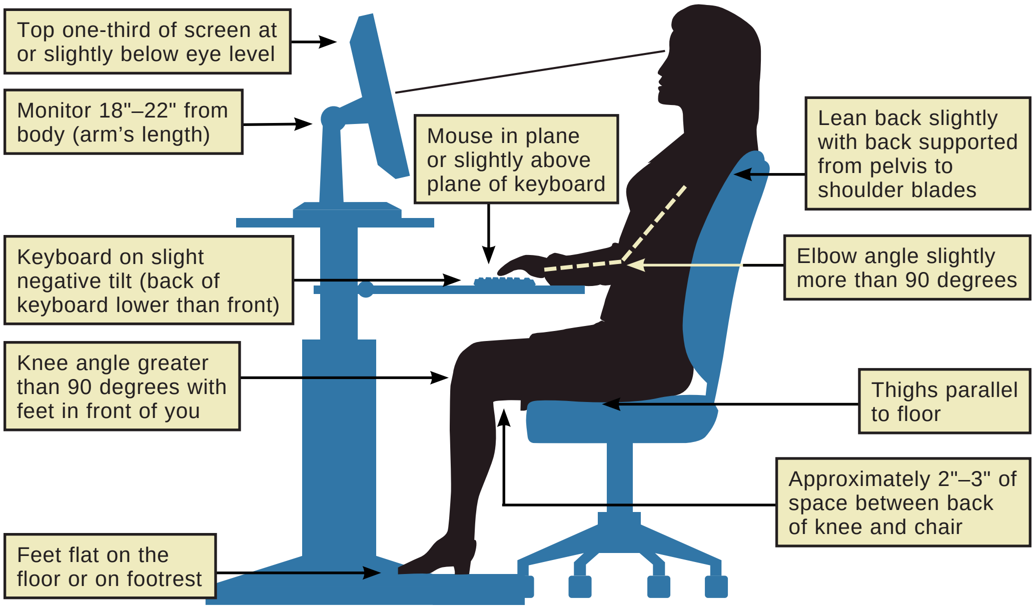
Brightness and contrast. Brighter monitors that offer more contrast give you more options for adjustments that can help you avoid eye strain. Measured in candelas per square meter (cd/m^2), devices with 200 to 250 cd/m^2 are fine for most productivity tasks, whereas brighter devices are more desirable for movies and gaming. Glossy screens can seem to increase brightness and contrast, but might not be optimal in an environment where there is glare from windows or bright lights.

Viewing angle. The best displays can be viewed from the front or sides without drastic changes in brightness or color shifts. Some vendors provide a measurement of viewing angle; higher numbers correspond to wider viewing angles and better quality devices.

Response time. The speed at which pixels change color is referred to as response time. Display devices with poor response rate can appear blurry and leave “ghost” trails of the mouse pointer and other moving objects.

Notebook computers present an ergonomic problem because the screen and keyboard are attached to each other. Placement becomes a compromise between the best viewing angle and the best typing height. You might try using an external keyboard or monitor to avoid eye strain and bad posture. Figure 11-10 illustrates optimal equipment placement; consider how you can adjust your computer, monitor, keyboards, desk, and chair for a more ergonomic work area.

Figure 11-10


Top one-third of screen at or slightly below eye level
Monitor 18"–22" from body (arm’s length)
Mouse in plane or slightly above plane of keyboard
Lean back slightly with back supported from pelvis to shoulder blades
Keyboard on slight negative tilt (back of keyboard lower than front)
Elbow angle slightly more than 90 degrees
Knee angle greater than 90 degrees with feet in front of you
Thighs parallel to floor
Approximately 2"–3" of space between back of knee and chair
Feet flat on the floor or on footrest

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Project

Explore spreadsheet software

Spreadsheet software has gained much popularity not only in businesses but also in homes. With its many useful features, spreadsheet software has proven to be a major timesaver in accomplishing personal tasks, such as managing household budgets, analyzing “what-if” scenarios for future expenses, and balancing checkbooks.

When you have completed the project, you should be able to:

- Create worksheets using handy features, such as the drag-and-fill method.
- Apply formatting options to worksheets.
- Create formulas and use spreadsheet software’s built-in functions.
- Build charts based on data in worksheets.

Requirements: This project requires Microsoft Windows 7 and spreadsheet software, such as Microsoft Office Excel or OpenOffice Calc.

Deliverables:

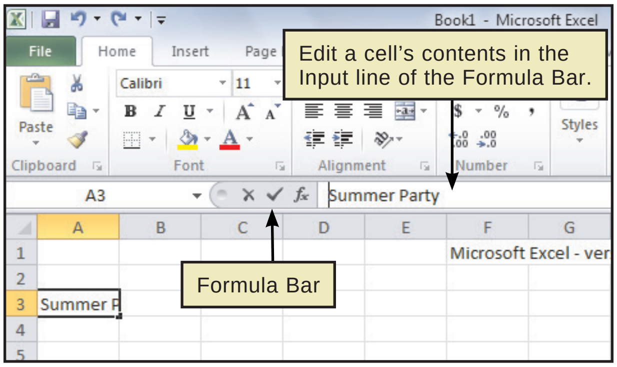
1 A worksheet containing expenses for a summer party

2 A worksheet containing a graph of snowfall statistics

1. Open your spreadsheet software. A blank worksheet should appear on the screen. Click cell F1, and enter the name of your spreadsheet software and its version number. Click cell F2 and enter your name.

2. Suppose you want to plan a summer party for about 30 people. You have a food budget of $125. You can create a worksheet to compute what you might need for the party and what you can afford. In cell A3, type **Summer Party** and press the Enter key.

If you notice an error after pressing Enter, click cell A3 to display the text in the Input line of the Formula Bar, as in the example here. Click the text in the Input line, correct it, and press the Enter key.



Edit a cell’s contents in the Input line of the Formula Bar.

Formula Bar

3. In row 4, type each of the following labels in a separate cell, starting with column A and ending with column D: **Food**, **Quantity**, **Unit Cost**, and **Total Cost**.

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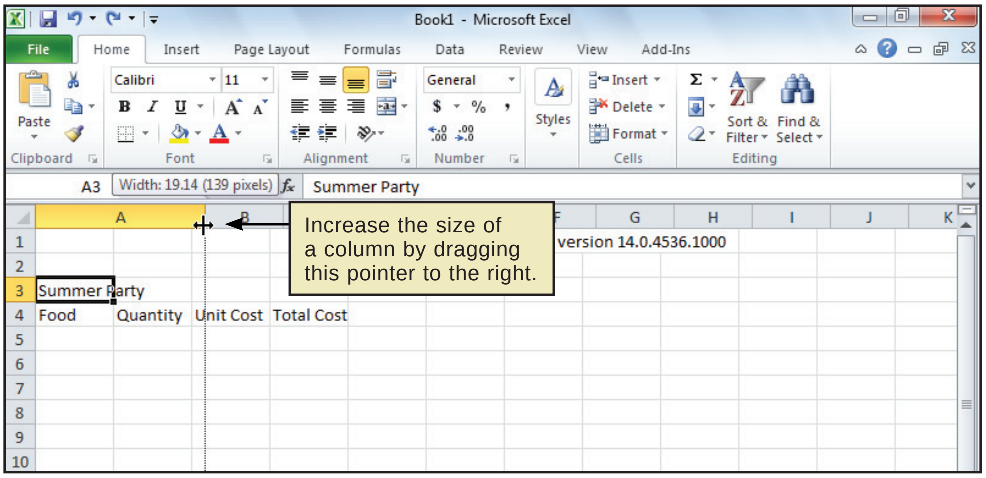
• Explore spreadsheet software (continued)

4. Double the size of column A by resting your pointer on the column's right border so the pointer changes to a ⇹ shape. Drag the pointer to the right until you reach the desired size, as in the example below.

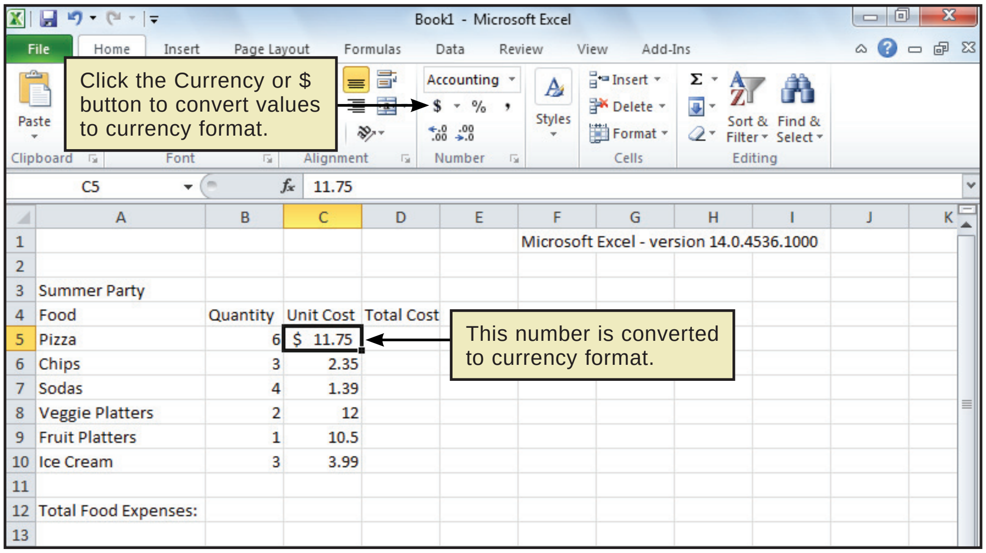

Book1 - Microsoft Excel
File
Home
Insert
Page Layout
Formulas
Data
Review
View
Add-Ins
Paste
Clipboard
Calibri
11
Font
Alignment
General
Number
Styles
Insert
Delete
Format
Cells
Sort & Filter
Find & Select
Editing

A3 Width: 19.14 (139 pixels) Summer Party

Increase the size of a column by dragging this pointer to the right.

	A	B	F	G	H	I	J	K
1			version 14.0.4536.1000					
2								
3	Summer Party							
4	Food	Quantity	Unit Cost	Total Cost				
5								
6								
7								
8								
9								
10								

5. Enter all the other values and labels in the cells, based on the example below. Convert all Unit Cost values to currency format with dollar signs. To do this, click each cell and then click the $ button on the Microsoft Excel ribbon or the Currency button in the OpenOffice Calc toolbar.


Book1 - Microsoft Excel
File
Home
Insert
Page Layout
Formulas
Data
Review
View
Add-Ins
Paste
Clipboard
Font
Alignment
Accounting
Number
Styles
Insert
Delete
Format
Cells
Sort & Filter
Find & Select
Editing

Click the Currency or $ button to convert values to currency format.

C5 11.75

	A	B	C	D	E	F	G	H	I	J	K
1						Microsoft Excel - version 14.0.4536.1000					
2											
3	Summer Party										
4	Food	Quantity	Unit Cost	Total Cost							
5	Pizza	6	$ 11.75								
6	Chips	3	2.35								
7	Sodas	4	1.39								
8	Veggie Platters	2	12								
9	Fruit Platters	1	10.5								
10	Ice Cream	3	3.99								
11											
12	Total Food Expenses:										
13											

This number is converted to currency format.

6. The total cost of pizzas can be calculated by multiplying the Quantity by Unit Cost. Click cell D5, type **=B5*C5**, and press the Enter key. The answer is displayed as $70.50.

7. You can use the **drag-and-fill method** to apply the same formula to all other cells in the Total Cost column. Click cell D5 and point to the lower-right corner of the cell. The pointer changes to a + crosshair shape called the fill handle. Drag the fill handle down to cell D10.

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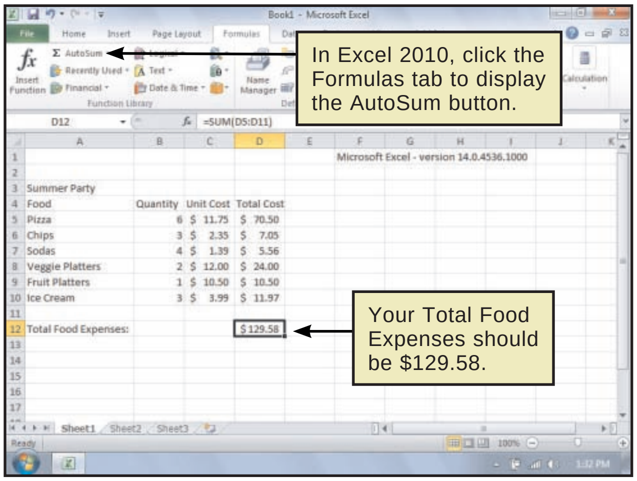
• Explore spreadsheet software (continued)

8. To compute Total Food Expenses, click cell D12 and apply the SUM function. In Excel 2010, first click the Formulas tab, then click the Σ AutoSum button. In OpenOffice Calc, click the Σ Sum button on the Formula Bar. When the formula appears, press the Enter key. The Total Food Expenses value should be displayed.


Book1 - Microsoft Excel
File
Home
Insert
Page Layout
Formulas
Insert Function
AutoSum
Recently Used
Financial
Text
Date & Time
Function Library
Name Manager
Calculation
Sheet1
Sheet2
Sheet3
Ready
100%

In Excel 2010, click the Formulas tab to display the AutoSum button.

D12 =SUM(D5:D11)

Microsoft Excel - version 14.0.4536.1000

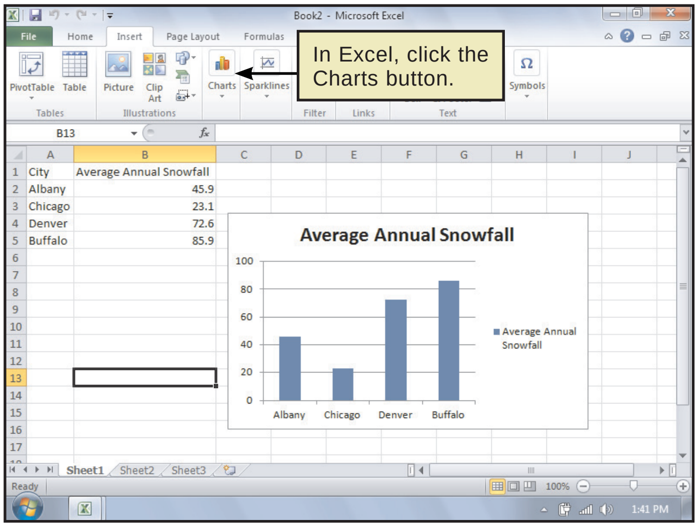
	A	B	C	D
1				
2				
3	Summer Party			
4	Food	Quantity	Unit Cost	Total Cost
5	Pizza	6	$ 11.75	$ 70.50
6	Chips	3	$ 2.35	$ 7.05
7	Sodas	4	$ 1.39	$ 5.56
8	Veggie Platters	2	$ 12.00	$ 24.00
9	Fruit Platters	1	$ 10.50	$ 10.50
10	Ice Cream	3	$ 3.99	$ 11.97
11				
12	Total Food Expenses:			$ 129.58

Your Total Food Expenses should be $129.58.

9. Note that the value for Total Food Expenses exceeds your $125 budget. Experiment with different values, such as cheaper ice cream or fewer pizzas, until the value in the Total Food Expenses cell is $125 or less. Save your worksheet as **Project 11A [Your Name]**.

10. Next, you'll create a chart showing snowfall statistics for four major cities. Click the File menu or File tab and select New. In Excel, select a blank workbook, then click the Create button. In Calc, select Spreadsheet. Enter the City and Average Annual Snowfall labels and values shown in columns A and B below.

11. To create the chart, first select cells A1 through B5. In Excel, click the Insert tab, click Charts, and then click the Column button. Select the Clustered Column chart in the 2D Column section. In OpenOffice Calc, click the Chart toolbar button, then click the Finish button.


Book2 - Microsoft Excel
File
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Formulas
PivotTable
Table
Picture
Clip Art
Charts
Sparklines
Symbols
Tables
Illustrations
Filter
Links
Text
B13
Average Annual Snowfall
100
80
60
40
20
0
Albany
Chicago
Denver
Buffalo
Average Annual Snowfall
Sheet1
Sheet2
Sheet3
Ready
100%
1:41 PM

In Excel, click the Charts button.

	A	B
1	City	Average Annual Snowfall
2	Albany	45.9
3	Chicago	23.1
4	Denver	72.6
5	Buffalo	85.9

12. Follow the on-screen instructions to finalize the chart and save it as **Project 11B [Your Name]**. Submit your worksheets as a file, e-mail attachment, or printout according to your instructor's preference.

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Issue

Who's to blame for faulty software?

Back in the days when spreadsheets first captured the attention of corporate bean counters, a Florida contractor created a worksheet to itemize the costs of a large construction project. Somehow, $254,000 of expenses were not incorporated in the final total. The company lost money on the project and sued the software publisher, who countered that it was not responsible for user errors, and pointed to a disclaimer in the end-user license agreement (EULA) limiting liability to the cost of the software.

Since the first salvo over software product liability, several cases have been settled in court, usually in favor of the software publisher. Consumer advocates have expressed dismay over the liability chasm that exists between software and other products. Lawsuits against manufacturers that produce malfunctioning physical products are often successful. Car manufacturers, toymakers, and pharmaceutical companies have all felt the legal bite of angry consumers.

What makes software different from other products when it comes to liability? Software publishers claim that their products are so complex that perfection is impossible. They point to patches designed to fix bugs and are available free of charge—the software industry's version of a product recall. Publishers also reiterate that license agreements clearly state the terms and conditions of software use; anyone who is not comfortable with those terms can simply choose not to use the software.

After a spate of lawsuits in which the courts sided with software publishers, consumers seemed resigned to software being marketed "as is" with flaws, bugs, and limited liability. However, the issue resurfaced in the context of security. A class action suit in California took Microsoft to task for selling software riddled with security flaws. Consumers were unhappy that various parts of the Windows operating system, e-mail client, and Web browser could be exploited by hackers to spread viruses and gain unauthorized access to personal computers. Microsoft responded to the accusation: "The problems caused by viruses and other security attacks are the result of criminal acts by the people who write viruses."

Today's software contains flaws and users can make mistakes, especially when it comes to number-crunching. The moral of this story: Don't trust your results until you've verified them.

What do you think?

1. Do you usually read the EULA that's supplied with your software? ○ Yes ○ No ○ Not sure

2. Should software publishers be held responsible for errors that result from errors, or bugs, in the software code? ○ Yes ○ No ○ Not sure

3. Should software publishers be held responsible if user errors result in business or personal losses? ○ Yes ○ No ○ Not sure

Save It!

QuickCheck A

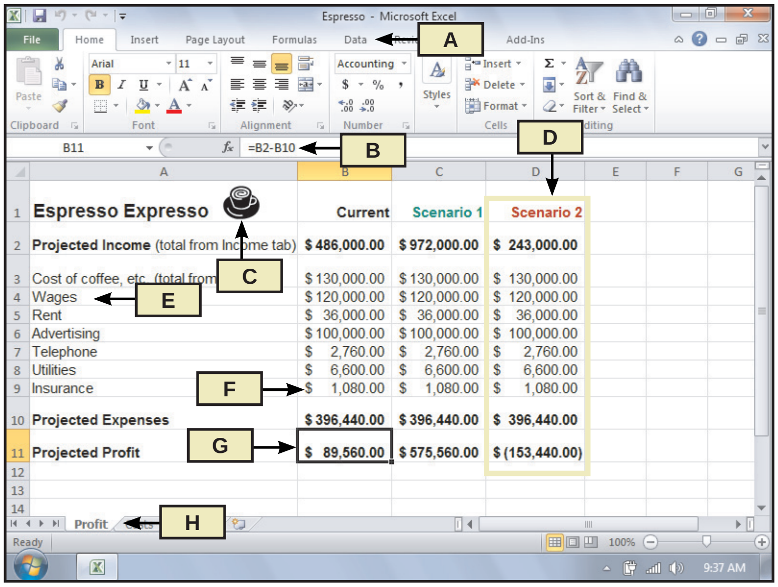
1. You can design a worksheet to be a numeric that you can use to examine “what-if” scenarios.
2. D9, A6, and Q8 are examples of cell .
3. SUM, PMT, and AVERAGE are spreadsheet .
4. True or false? If you create a graph showing baseball players’ home runs, you can change the number of runs for a player on the worksheet and the graph will automatically reflect the change.
5. True or false? Ergonomics is a specific disease that affects muscles, tendons, and nerves.

CheckIt!

QuickCheck B

Indicate the letter that correctly matches each description.

1. A cell containing a label
2. A cell containing a value
3. A cell containing a formula
4. The formula for cell B11
5. A “what-if” analysis


Espresso - Microsoft Excel
File
Home
Insert
Page Layout
Formulas
Data
Add-Ins
A
Arial
11
Accounting
Styles
Insert
Delete
Format
Sort & Filter
Find & Select
Paste
Clipboard
Font
Alignment
Number
Cells
diting
B11
B
D
C
E
F
G
Profit
H
Ready
100%
9:37 AM

B11 =B2-B10

	A	B	C	D
1	**Espresso Expresso**	**Current**	**Scenario 1**	**Scenario 2**
2	**Projected Income** (total from Income tab)	**$ 486,000.00**	**$ 972,000.00**	**$ 243,000.00**
3	Cost of coffee, etc. (total from	$ 130,000.00	$ 130,000.00	$ 130,000.00
4	Wages	$ 120,000.00	$ 120,000.00	$ 120,000.00
5	Rent	$ 36,000.00	$ 36,000.00	$ 36,000.00
6	Advertising	$ 100,000.00	$ 100,000.00	$ 100,000.00
7	Telephone	$ 2,760.00	$ 2,760.00	$ 2,760.00
8	Utilities	$ 6,600.00	$ 6,600.00	$ 6,600.00
9	Insurance	$ 1,080.00	$ 1,080.00	$ 1,080.00
10	**Projected Expenses**	**$ 396,440.00**	**$ 396,440.00**	**$ 396,440.00**
11	**Projected Profit**	**$ 89,560.00**	**$ 575,560.00**	**$ (153,440.00)**

CheckIt!

GetIt?

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 11.

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CHAPTER 12

Accessing Databases

What's Inside?

In Chapter 12, you'll find out how to decide whether you need database software. You'll learn how to create your own databases and you'll discover some of the privacy issues associated with databases that contain information about you. The Hardware section examines tracking devices; you'll see how they relate to databases and privacy issues.

- **FAQs:**

  - What's a database? 171
  - Do I need database software? 172
  - How would I create my own database? 173
  - Can I really create databases with spreadsheet software? 174
  - What about databases on the Web? 175
- **Hardware:** Tracking devices 176
- **Project:** Explore databases 179
- **Issue:** Who owns information about me? 182
- **QuickChecks** 183

What's on the CD?

The Try It! features and videos in Chapter 12 show you the inner workings of databases and tracking technologies.

- Take a tour of database software 172
- Discover how to create your own database 173
- Explore the data-handling features of spreadsheet software 174

FAQ What's a database?

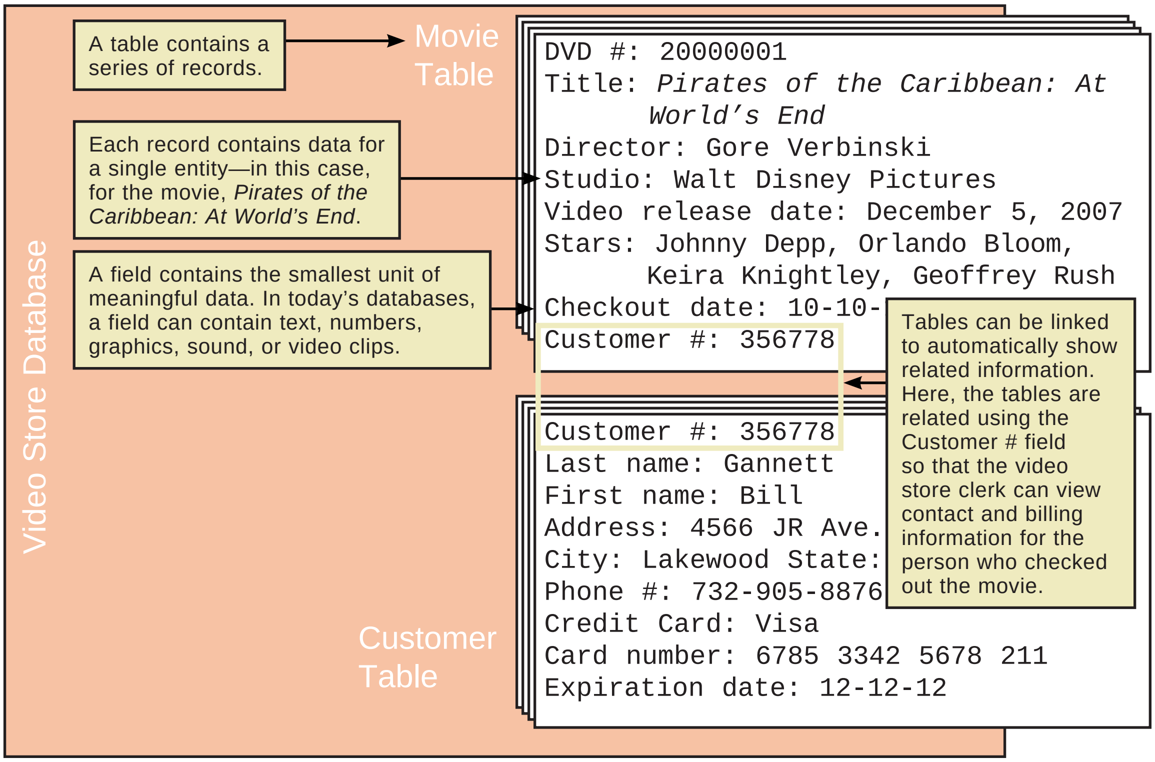
In popular usage, the term "database" simply means a collection of data. Some databases are structured, whereas others are free-form. Examples of structured databases include phone books, flight schedules, or a store's inventory list. A CD containing back issues of *TIME* magazine would be an example of a free-form database. You could consider the documents stored on your computer to be a free-form database. You could also regard the Web, with its millions of documents, as a free-form database.

A **structured database** contains information that is organized as fields, records, and files. A **field** contains a single piece of information, such as a name, birth date, or zip code. A **record** contains fields of information about a single entity in the database—a person, place, event, or thing. A group of similarly structured records can be stored in a file.

A structured database makes it easy to locate records using a query. A **query** is a search specification, usually consisting of one or more keywords. When you search for music on iTunes, for example, the musicians' names and song titles you enter into the search box are a query.

A **relational database** allows you to store information in two or more different types of records and form a link between them. Each type of record is stored in a **table**. For example, a video store database might include a table of movies and a table of customers. Suppose that a customer checks out the movie, *Pirates of the Caribbean: At World's End*. The clerk simply enters the customer number on the Pirates of the Caribbean record. If the movie is never returned, the customer number acts as a link to the customer table that displays the customer's address, phone number, and credit card billing information. Figure 12-1 illustrates how two tables can be joined together based on data in the Customer # field.

Figure 12-1



A table contains a series of records.

Each record contains data for a single entity—in this case, for the movie, *Pirates of the Caribbean: At World's End*.

A field contains the smallest unit of meaningful data. In today's databases, a field can contain text, numbers, graphics, sound, or video clips.

```
DVD #: 20000001
Title: Pirates of the Caribbean: At
       World's End
Director: Gore Verbinski
Studio: Walt Disney Pictures
Video release date: December 5, 2007
Stars: Johnny Depp, Orlando Bloom,
       Keira Knightley, Geoffrey Rush
Checkout date: 10-10-
Customer #: 356778
```

```
Customer #: 356778
Last name: Gannett
First name: Bill
Address: 4566 JR Ave.
City: Lakewood State:
Phone #: 732-905-8876
Credit Card: Visa
Card number: 6785 3342 5678 211
Expiration date: 12-12-12
```

Tables can be linked to automatically show related information. Here, the tables are related using the Customer # field so that the video store clerk can view contact and billing information for the person who checked out the movie.

FAQ Do I need database software?

Database software, sometimes referred to as a database management system (DBMS), provides a set of tools to enter and update information in fields, delete records, sort records, search for records that meet specified criteria, and create reports. Most people use databases with surprising frequency, but might not need database software. Why?

Consider the databases that you typically access. You might access a database to register online for a class at a college or university. You might search a product database at a Web site, such as Amazon.com. You might access your bank's database at an ATM to check your account balance. When you access such databases, the database software runs on a computer at the host site—not on your own PC. Therefore, you do not need database software to interact with the databases at school, on the Web, or at your bank. Having database software is useful primarily to create and maintain your own databases.

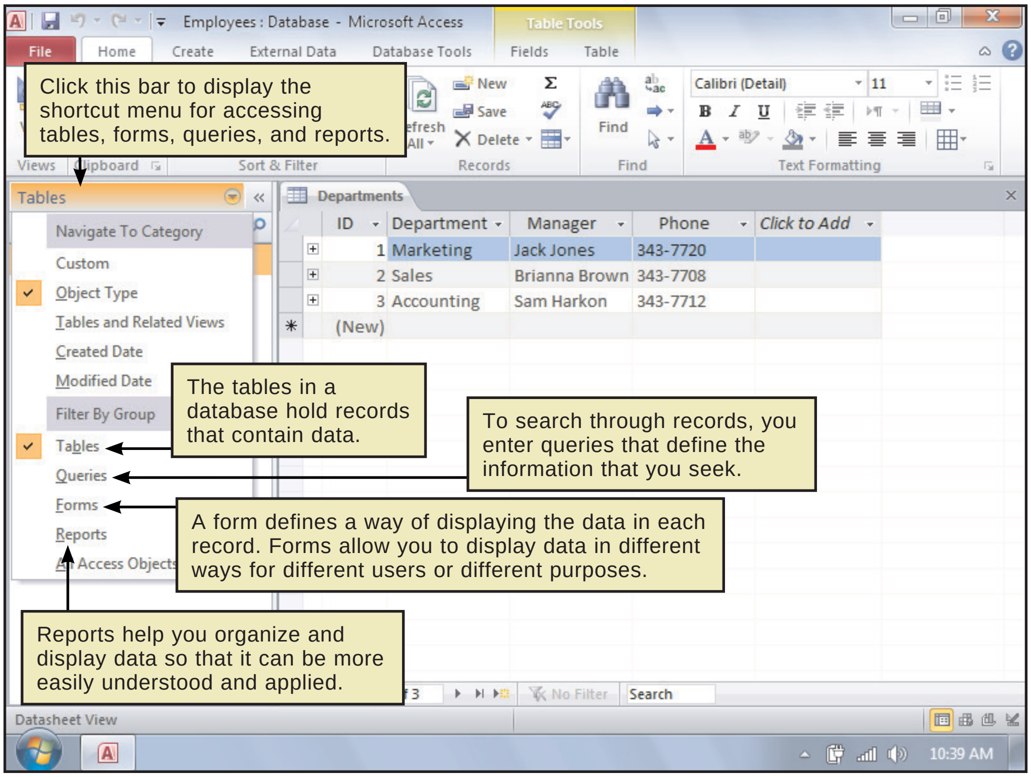
If you have a use for database software, a variety of options are available. For example, Microsoft Access and MySQL provide a wealth of data management capabilities, but using them to create production-quality databases requires a substantial learning commitment. MyDatabase, FileMaker Pro, and OpenOffice Base might be easier to learn and they include the basic features needed to manage typical files and databases.

Web apps, such as Zoho Creator, are available for creating online databases. You can also use spreadsheet software for simple databases. You'll learn more about this option in a later FAQ.

Click the Try It! button for a tour of database software. You'll learn how you might work with tables, searches, queries, forms, and reports. You'll also see how relational databases link multiple tables to provide flexible access to data.

TryIt!

Figure 12-2


Employees : Database - Microsoft Access
Table Tools
File
Home
Create
External Data
Database Tools
Fields
Table
New
Save
Delete
Refresh All
Find
Calibri (Detail)
11
Views
Clipboard
Sort & Filter
Records
Find
Text Formatting
Tables
Navigate To Category
Custom
Object Type
Tables and Related Views
Created Date
Modified Date
Filter By Group
Tables
Queries
Forms
Reports
All Access Objects
Departments
No Filter
Search
Datasheet View
10:39 AM

ID	Department	Manager	Phone	Click to Add
1	Marketing	Jack Jones	343-7720	
2	Sales	Brianna Brown	343-7708	
3	Accounting	Sam Harkon	343-7712	
(New)				

Click this bar to display the shortcut menu for accessing tables, forms, queries, and reports.

The tables in a database hold records that contain data.

To search through records, you enter queries that define the information that you seek.

A form defines a way of displaying the data in each record. Forms allow you to display data in different ways for different users or different purposes.

Reports help you organize and display data so that it can be more easily understood and applied.

FAQ How would I create my own database?

Creating a database consists of two tasks: creating a file structure to hold the data and adding the data for each record. The specific procedure you'll use depends on the database software that you've selected, so you can refer to your software documentation for exact instructions.

Suppose you want to create a household inventory in case you need it for an insurance claim. First, you can use your database software to create the **file structure**—a specification for the database fields and their characteristics. You'll need to assign a name to each field, such as Category, Item, Description, Purchase Date, Value, or Photo. Some database software might require you to specify the maximum length of each field. You might also have to specify the **data type** for each field, which indicates whether it will hold text, numbers, dates, or graphics.

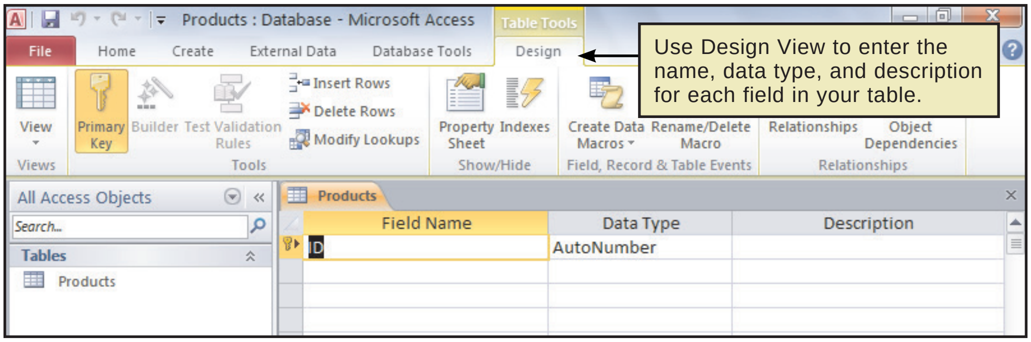
Once you have created the file structure, your database software displays it as a blank table that you can use to fill in the data for each household item. You will be able to reliably locate data in your database only if you enter data accurately and consistently. Keep these tips in mind when you enter data:

- **Be accurate.** As you enter each record, compare the on-screen data to your original documents to verify its accuracy.
- **Be consistent with grouping terms.** Use the same set of terms for fields that might be used to group your data. Suppose you plan to group your household inventory by categories such as jewelry, furniture, appliances, and electronics. You must then enter "jewelry"—not "jewels"—in the Category field for your diamond ring.
- **Use consistent capitalization.** Most database software is case sensitive. Be aware that if you enter "Microwave oven," case-sensitive database software will not find anything when you later search for "microwave oven."
- **Make sure your spelling is correct.** If you misspell an item—such as "portable jakuzi"—when you add it to the database, you won't be able to find it if you later search for "portable jacuzzi."
- **Use abbreviations consistently.** To your database software, "TV" and "T.V." are completely different.
- **Be careful about symbols.** The telephone number (906) 227-1000 is not the same as 906.227.1000.

Click the Try It! button to learn how to create a database using Microsoft Access. You'll find out how to specify field names and select data types.

TryIt!

Figure 12-3


Products : Database - Microsoft Access
Table Tools
File
Home
Create
External Data
Database Tools
Design
View
Primary Key
Builder
Test Validation Rules
Insert Rows
Delete Rows
Modify Lookups
Property Sheet
Indexes
Create Data Macros
Rename/Delete Macro
Relationships
Object Dependencies
Views
Tools
Show/Hide
Field, Record & Table Events
Relationships
All Access Objects
Search...
Tables
Products
Products
Field Name
Data Type
Description
ID
AutoNumber

Use Design View to enter the name, data type, and description for each field in your table.

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FAQ Can I really create databases with spreadsheet software?

You can use most spreadsheet software to create and maintain files of information. However, you cannot use it to join files or tables together and create a relational database.

Spreadsheet software typically has special data-handling features that allow you to manipulate the rows and columns of a worksheet as if they were records and fields in a database. You can sort your data, search for data that meets specific criteria, and create reports. As a rule of thumb, spreadsheet software can handle any data that you could put on a set of cards in a card file.

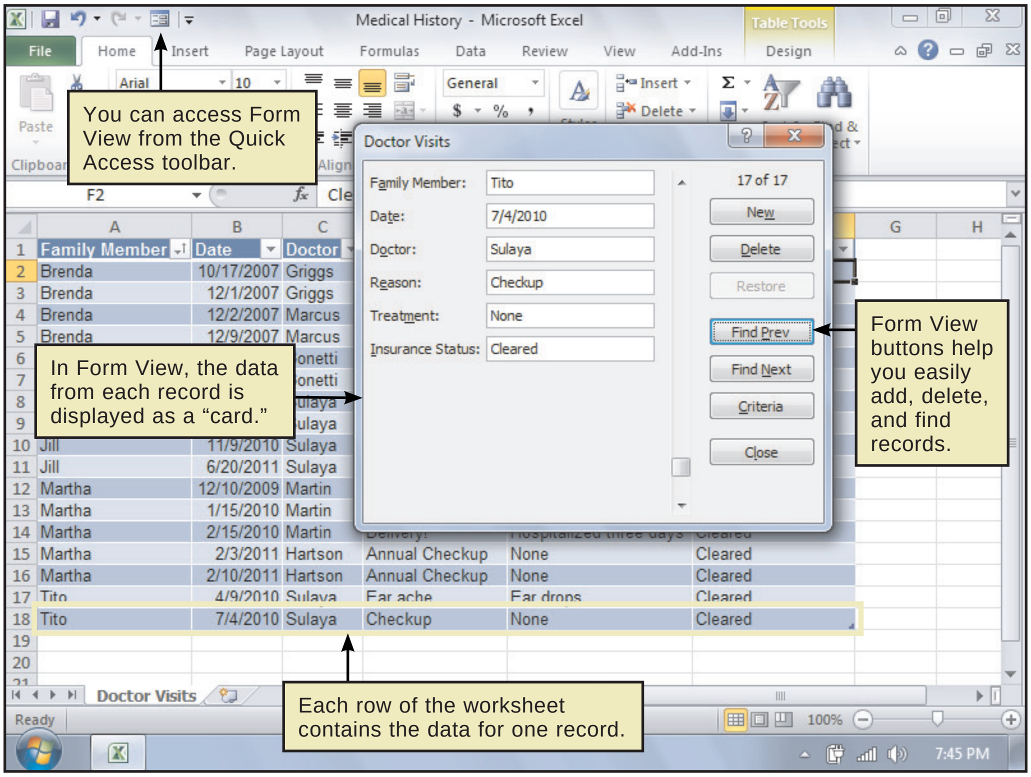
When managing data with spreadsheet software, the Form View displays each row of the worksheet as a "card" containing a series of fields, as shown in Figure 12-4. If you already know how to use spreadsheet software and your data lends itself to the card-file approach to data management, you'll find it easy to use the Form View for basic operations, such as entering, modifying, searching, and sorting data.

A process called **filtering** (also called extracting) data is a bit more complicated, but useful for creating reports that show only selected data. For example, suppose you have 100 rows in a worksheet that you're using as a database. Each row contains information on doctor visits for members of your family. If you want the worksheet to display only those records for your oldest daughter, you'll need to filter the data using her name. You could then print the filtered version of the worksheet to produce a hard-copy report of her medical history.

Click the Try It! button for a demonstration of how to use spreadsheet software such as Excel to manage data.

Try It!

Figure 12-4



Family Member: Tito
Date: 7/4/2010
Doctor: Sulaya
Reason: Checkup
Treatment: None
Insurance Status: Cleared

	A	B	C	D	E	F
1	Family Member	Date	Doctor			
2	Brenda	10/17/2007	Griggs			
3	Brenda	12/1/2007	Griggs			
4	Brenda	12/2/2007	Marcus			
5	Brenda	12/9/2007	Marcus			
10	Jill	11/9/2010	Sulaya			
11	Jill	6/20/2011	Sulaya			
12	Martha	12/10/2009	Martin			
13	Martha	1/15/2010	Martin			
14	Martha	2/15/2010	Martin	Delivery	Hospitalized three days	Cleared
15	Martha	2/3/2011	Hartson	Annual Checkup	None	Cleared
16	Martha	2/10/2011	Hartson	Annual Checkup	None	Cleared
17	Tito	4/9/2010	Sulaya	Ear ache	Ear drops	Cleared
18	Tito	7/4/2010	Sulaya	Checkup	None	Cleared

You can access Form View from the Quick Access toolbar.

In Form View, the data from each record is displayed as a "card."

Form View buttons help you easily add, delete, and find records.

Each row of the worksheet contains the data for one record.

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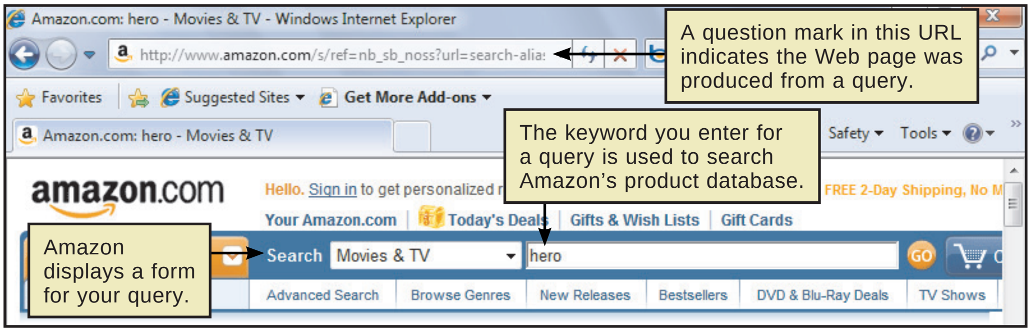
FAQ What about databases on the Web?

You'll find many databases on the Web that are populated with all sorts of information. For example, you can look for your old roommate in a phone-book-style database that covers the entire country; find a low-cost airfare to Beijing in a database that contains flight schedules for major airlines; look for the author of *Trout Madness* in the U.S. Library of Congress database; check the value of a 1964 Ford Mustang in a digital Blue Book database; find a definition of the term "CD-R" in a database of technical terms; or sift through your favorite band's music at the iTunes store.

When you use a browser to access databases on the Web, you'll typically enter a query using an **HTML form**. The form might simply consist of a single text box where you can enter one or more keywords. This type of query is common when searching for specific products at e-commerce sites. When you see a question mark in a URL, such as the one in Figure 12-5, your browser is displaying the results of a database query.

Figure 12-5


Amazon.com: hero - Movies & TV - Windows Internet Explorer
http://www.amazon.com/s/ref=nb_sb_noss?url=search-alias
Favorites
Suggested Sites
Get More Add-ons
Amazon.com: hero - Movies & TV
Safety
Tools
amazon.com
Hello. Sign in to get personalized r
FREE 2-Day Shipping, No M
Your Amazon.com
Today's Deals
Gifts & Wish Lists
Gift Cards
Search
Movies & TV
hero
GO
Advanced Search
Browse Genres
New Releases
Bestsellers
DVD & Blu-Ray Deals
TV Shows

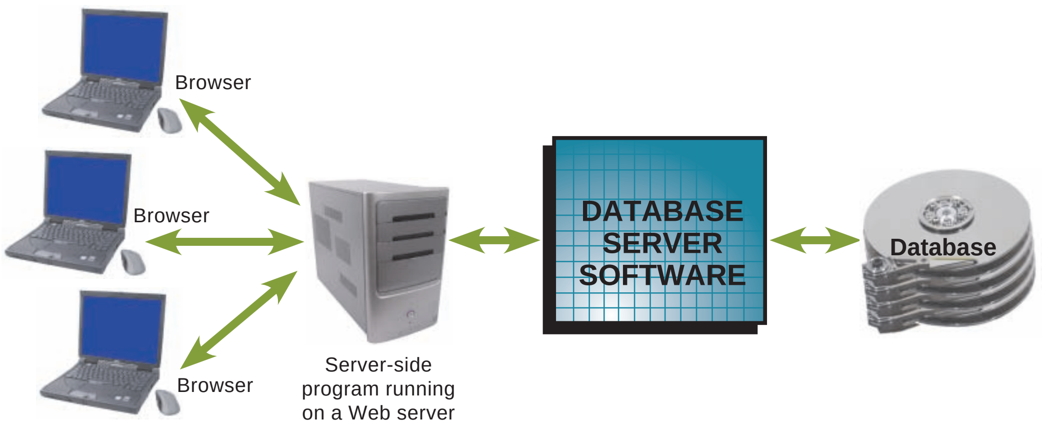
A question mark in this URL indicates the Web page was produced from a query.

The keyword you enter for a query is used to search Amazon's product database.

Amazon displays a form for your query.

You can also add data to an online database, a process that typically takes place when you register for an account at a Web site or when you check out from an e-commerce site. The data that you entered into a form is collected by a program that runs on the Web site's server. That information is passed along to the database software, which in turn transfers your data into the database itself. Figure 12-6 helps you visualize the setup of databases that work behind the scenes on the Web.

Figure 12-6


Browser
Browser
Browser
Server-side program running on a Web server
DATABASE SERVER SOFTWARE
Database

Transferring data from a form to a Web server, then to a database server, and finally to the database might seem like a complex process, but separating the database from public access enhances security. Banking and e-commerce databases would certainly be less secure if consumers were entering their data directly; granting public access to a database would increase the risk of unauthorized changes to the data.

Hardware

Tracking devices

Today, location-aware devices and contactless ID cards are everywhere, used by ordinary consumers, retailers, law enforcement, hotels, credit card companies, high-profile NASCAR teams, and others.

With the increasing popularity of tracking devices come many questions. Can you be tracked without your knowledge? Is tracking data stored in databases without your permission? How many of your devices can track your location? Can these devices track even when they are turned off? To answer these questions, you need to know a little about today's most common tracking technologies: radio, cellular, GPS, and RFID.

Figure 12-7

BRICKHOUSE
SECURITY
BRICKHOUSE

Real-time locating systems are similar to baby monitors. With a range that covers approximately 600 feet, they can be used to keep a virtual eye on children and pets. A tracking device worn by the trackee transmits signals to a nearby base station using radio waves.

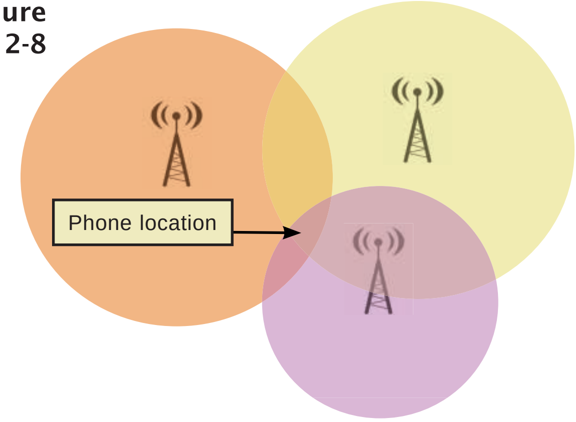
Radio tracking devices can be configured to issue an alert when the trackee moves out of a designated area—for example, to alert a parent that a child has wandered out of the backyard. These devices can also be used for surveillance as long as the tracker stays within range of the trackee.

Cellular phones also offer tracking capabilities because they can determine their geographic location using either mobile locating or GPS technology. Computers equipped with cellular air-cards for Internet service also support location-aware applications.

Mobile locating (sometimes called mobile triangulation) tracks the position of a cellular device based on its distance from cell towers. The accuracy of mobile locating depends on the number of nearby towers and the coverage area.

A cell phone tower covers a roughly circular area anywhere from 0.5 mile to 30 miles in diameter. In rural areas, for example, a single cell tower might provide service for a five-mile radius. A cellular device can determine its approximate distance from the tower by transmitting a short signal and gauging the time for a response. Even when your distance from a tower is known, however, a tower with a non-directional antenna cannot determine if you are north, south, east, or west of it. Towers with directional antennas can more accurately pinpoint the direction from which a signal originates; but with a single tower, location cannot be determined with much accuracy.

Figure 12-8



In a situation where a cellular device is within range of more than one tower, accuracy increases dramatically. Signaling three towers, for example, produces circles for three ranges, and the phone is located where those circles overlap. Triangulation for a phone within range of two or more towers can be as accurate as 50 yards, which is pretty good for locating a motorist in trouble, but not sufficient for most surveillance or military activities.

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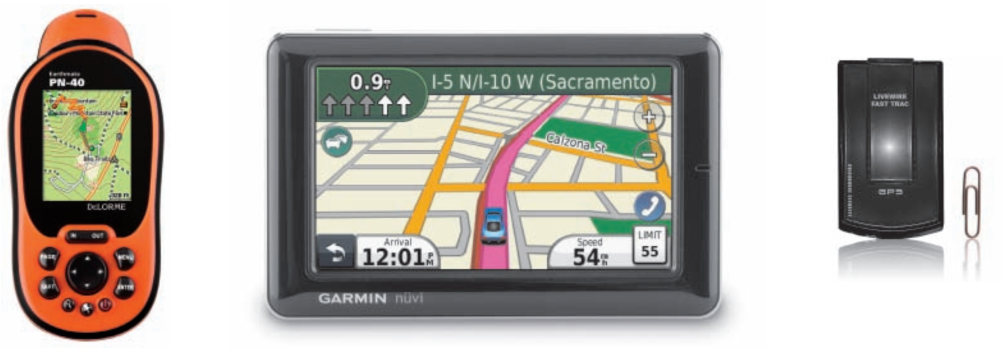
Hardware
(continued)

To triangulate its location from a tower, a cellular device has to be turned on. Your cell phone cannot be used to track your location when it is turned off. Whenever your phone is on, however, your cellular carrier has a record of the tower to which your phone is transmitting. Those records are stored in a database and can be accessed by law enforcement after obtaining a court order.

Despite its inability to tag its exact location, your cellular-enabled device can use mobile locating to display nearby highway maps, find businesses in the general vicinity, and locate a person who has dialed 911. First generation smartphones used this technology, but newer models use **GPS** (Global Positioning System) technology, which is much more accurate than cellular triangulation. GPS-enabled devices include many smartphones, handheld GPSs for outdoor activities, dash-mounted GPSs for driving, and GPS loggers for surveillance.

Figure 12-9



Handheld GPS

Dashboard-mounted GPS

GPS logger

GPS devices receive signals transmitted by a collection of earth-orbiting satellites. A GPS device needs to lock on to four satellites to determine a location. That process takes about a minute every time you turn on the device. During the startup process, the device downloads almanac and ephemeris data from the satellites. This data provides current information about the satellites' orbits and locations throughout the day.

Getting a lock requires that the device have a line of sight to the sky. Signals transmitted by GPS satellites can pass through clouds, plastic, and glass, but not through buildings or mountains, which is why GPS does not work indoors.

Once a GPS device has a satellite lock, its GPS chip continually monitors its location by executing a series of calculations based on its distance from each of the satellites. Consumer level GPS devices are accurate to about 30 feet.

A basic GPS device has two components: a receiver/antenna to pick up satellite signals and a GPS chip to perform the calculations necessary to pinpoint its location. These devices know their location, but don't broadcast it. Handheld and dash-mounted GPS units can tell you where you are, but don't transmit that information. GPS satellites are not equipped to receive location data, so any GPS device that sends location data requires additional transmitting capabilities, which are usually supplied by cellular service.

The use of GPS-enabled tracking is exploding. Tiny GPS loggers can be inconspicuously mounted on rental cars, taxis, or trucks to log locations at various intervals. The device can later be retrieved and its database of geographical points uploaded to a computer.

Hardware

(continued)

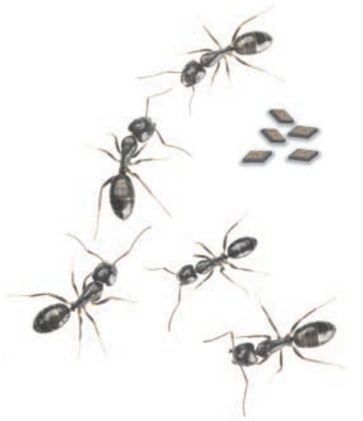
Dedicated GPS people trackers include devices that can be locked onto a wrist or elbow, carried in a purse, incorporated in an ID badge, or strapped to a belt. Used for keeping track of kids, elderly parents, pets, employees, and parolees, these devices can monitor the location and moving speed of the person being tracked. Used as a geofence, this type of device can send an alert when the person moves outside of a defined area, and can surreptitiously listen in on conversations. Alerts can be sent as text messages or e-mail. Detailed reports can be stored on the Web and accessed from a browser.

GPS-enabled cell phones can be configured to perform the same functions as dedicated GPS trackers. Software for these applications is available from cellular phone carriers and from independent software publishers. Once installed and running, the software periodically reports the phone's location to a Web server. The tracking map can be viewed by logging into the Web server with your personal user ID and password.

In addition to intentional tracking set up by the cell phone owner, a cell phone has the potential to determine its location using mobile locating or GPS, and broadcast it without the phone owner's permission or knowledge. Theoretically, such tracking can be done only by the cellular service provider with your permission (in the case of an emergency) or with a court order (in the case of a crime). Tracking is not possible if the phone is turned off or in areas where there is no cell service.

A third tracking technology, **RFID** (Radio Frequency Identification), is quite different from GPS and mobile locating. RFID is not location aware, and its main capability is transmitting identification information. RFID technology's main use is to identify, rather than geolocate. It is incorporated in passports, driver's licenses, credit cards, toll passcards, merchandise labels, and animal ID tags.

Figure 12-10



Some RFID tags are so small that they can be mounted to the backs of ants, enabling researchers to identify individual members of an ant colony.

An RFID tag is composed of a tiny read-only memory chip and transmitter that are incorporated onto a flexible backing. Each RFID tag includes an antenna that picks up electromagnetic energy beamed from a reader device. The chip uses this energy to send back data from the read-only memory chip. The big advantage of RFID is that tags can be scanned by a remote reader without swiping or making any sort of physical connection.

At the simplest level, an RFID tag stores a unique ID number that can be cross-checked with a database containing additional information. More sophisticated RFID tags contain a fairly extensive set of data, however. RFID credit cards, for example, include account numbers and expiration dates.

Unauthorized access is a potential problem with RFID tags. They can be read from a distance right through your clothes, purse, wallet, or backpack without your knowledge or consent. When carried in a wallet inside a purse, RFID cards can be read from a distance of nine feet. An RFID card casually carried in a pocket can be read from a distance of 20 feet. To prevent unauthorized scanning of any RFID cards that you carry, consider keeping them in protective sleeves or shielded wallets. You can find these products on the Web.

Project

Explore databases

Collections of data have existed since long before the term “database” was coined. However, the ability to store these collections electronically and manage them efficiently with database software has become so indispensable to our current lifestyle that it’s hard to imagine how we got along without them. In this chapter, you were shown how to design and build databases. You also learned that you can use spreadsheet software to perform basic database functions.

When you have completed the project, you should be able to:

- Create a database.
- Design and build tables.
- Use forms to modify records in a table.

Requirements: This project requires Microsoft Windows 7, database software (such as Microsoft Office Access or OpenOffice Base), or spreadsheet software if database software is not available.

Deliverables:

1 A database containing ten records for books in your collection

1. Open your database or spreadsheet software.

2. Suppose you have a personal library containing several books that you like to lend out to friends. To prevent lost or unreturned books, you can keep track of them by creating a simple library database. Create a database as follows:
   a. In Microsoft Access, on the File tab select the New option, then select Blank database.
   b. In OpenOffice Base, use the Database Wizard. Select the following options: *Create a new database*, *Do not register the database*, and *Open the database for editing*.
   c. If you’re using spreadsheet software, you should have a blank spreadsheet on your screen.

3. Name the database **[Your Name] Library** and click the Create or Save button. If you’re using spreadsheet software, use the Save As option and name the file **[Your Name] Library**.

4. Create a table.
   a. In Access, click the View button on the Home tab and select Design View. Name the table **Books List**.
   b. In Base, first click Tables in the Database pane to display the Tables window, then select *Create table in Design View*.
   c. If working with a spreadsheet, double-click the Sheet1 tab at the bottom of the window and rename it **Books List**.

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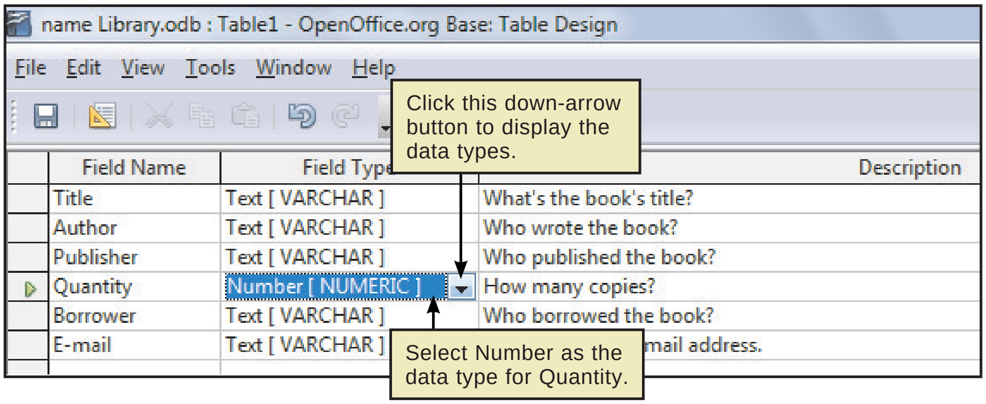
• Explore databases (continued)

5. Enter field names, data types, and descriptions in the table design, as in the example below. In Access, start typing the field names after the default ID field. For all fields except Quantity, specify the data type as Text. For Quantity, select Number as the data type. Click the down-arrow button in the Data Type box to display the data types. If you're working with a spreadsheet, use the field names as your column headings; you do not have to define data types.


name Library.odb : Table1 - OpenOffice.org Base: Table Design
File Edit View Tools Window Help

Field Name	Field Type	Description
Title	Text [VARCHAR]	What's the book's title?
Author	Text [VARCHAR]	Who wrote the book?
Publisher	Text [VARCHAR]	Who published the book?
Quantity	Number [NUMERIC]	How many copies?
Borrower	Text [VARCHAR]	Who borrowed the book?
E-mail	Text [VARCHAR]	mail address.

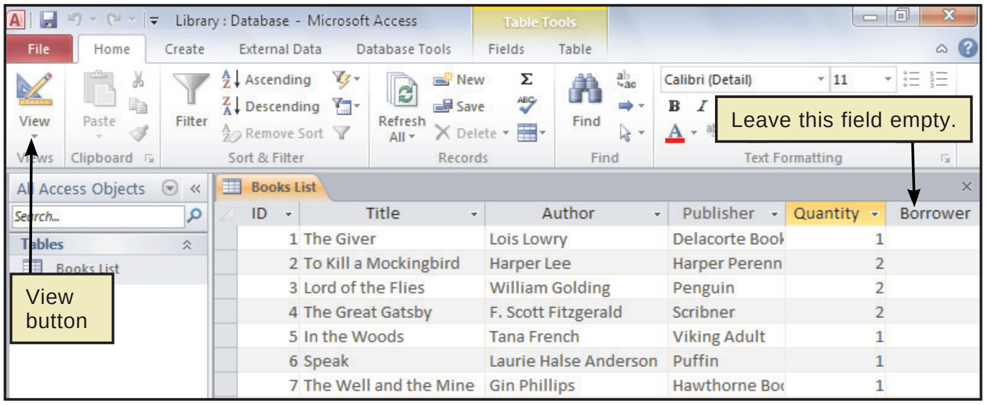
Click this down-arrow button to display the data types.

Select Number as the data type for Quantity.

6. A **primary key** is a field that functions as the unique identifier for each record. Access automatically created the field when the table was created. In Base you will need to add the field to the table; use ID as the field name, select Integer as the field type, and select Yes for AutoValue in the Field Properties section at the bottom of the window.

7. Save the table.
   a. In Access, click the Save button on the Quick Access toolbar, click the View button, then click Datasheet View.
   b. In Base, close the Design View window, save your changes, and name the table **Books List**. Double-click the Books List table to open it.

8. The empty table for Books List should now be displayed. Choose ten books that you own and fill in all fields, except Borrower and E-mail. In Access, double-click the Books List table. To expand columns, use the same method for increasing column sizes in spreadsheets. Click the Save button, then close the table.


Library : Database - Microsoft Access
Table Tools
File
Home
Create
External Data
Database Tools
Fields
Table
View
Paste
Filter
Ascending
Descending
Remove Sort
Refresh All
New
Save
Delete
Find
Calibri (Detail)
11
Views
Clipboard
Sort & Filter
Records
Find
Text Formatting
All Access Objects
Search...
Tables
Books List

ID	Title	Author	Publisher	Quantity	Borrower
1	The Giver	Lois Lowry	Delacorte Book	1	
2	To Kill a Mockingbird	Harper Lee	Harper Perenn	2	
3	Lord of the Flies	William Golding	Penguin	2	
4	The Great Gatsby	F. Scott Fitzgerald	Scribner	2	
5	In the Woods	Tana French	Viking Adult	1	
6	Speak	Laurie Halse Anderson	Puffin	1	
7	The Well and the Mine	Gin Phillips	Hawthorne Boo	1	

Leave this field empty.

View button

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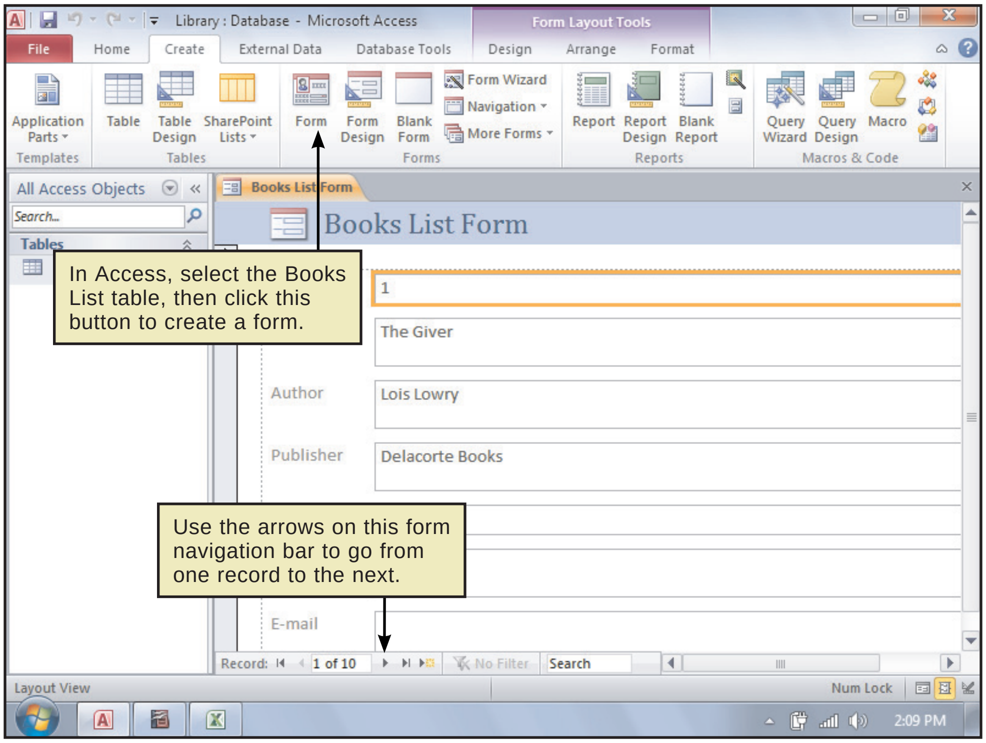
• Explore databases (continued)

9. If someone borrows a book from your library, you'll want to update your database. Instead of making changes directly on your datasheet or spreadsheet, you can use forms to easily update records in your table.

a. In Access, select the Books List table, click the Create tab and then click the Form button. Click the Save button on the Quick Access toolbar and name the form **Books List Form**.

b. In Base, click Forms in the Database pane, then use the Form Wizard. Select all fields from the Books List table to be displayed in the form. Select a columnar style and make sure that all data can be modified. Name the form **Books List Form**.

c. If you're using a spreadsheet, you can make your changes directly on the spreadsheet.


Library : Database - Microsoft Access
Form Layout Tools
File
Home
Create
External Data
Database Tools
Design
Arrange
Format
Application Parts
Templates
Table
Table Design
SharePoint Lists
Tables
Form
Form Design
Blank Form
Form Wizard
Navigation
More Forms
Forms
Report
Report Design
Blank Report
Reports
Query Wizard
Query Design
Macro
Macros & Code
All Access Objects
Search...
Tables
Books List Form
Record: 1 of 10
No Filter
Search
Layout View
Num Lock
2:09 PM

Books List Form

1

The Giver

Author: Lois Lowry

Publisher: Delacorte Books

E-mail

In Access, select the Books List table, then click this button to create a form.

Use the arrows on this form navigation bar to go from one record to the next.

10. Fill in the Borrower and E-mail fields for two of your records. In Access and Base, use the navigation bar at the bottom of the window or dialog box to move from one record to the next. Save your changes and close the Forms window.

11. Submit your database on disc, on a flash drive, as an e-mail attachment, or as a printout according to your instructor's preference.

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Issue

Who owns information about me?

There is an astounding amount of information stored about you in computer databases. Your bank has information on your financial status, credit history, and the people, organizations, and businesses to which you write checks. School records indicate something about your ability to learn and the subjects that interest you. Medical records indicate the state of your health. Credit card companies track the merchants you deal with and what you purchase in person, by mail, or over the Internet. Your phone company stores your phone number, your address, and a list of the phone numbers you dial. The driver's license bureau has your physical description. Your Internet cookies track many of the Web sites that you frequent. Using this data would make it possible to guess some very private things about you, such as your political views or even your sexual orientation.

When records were manually stored on index cards and in file folders, locating and distributing data was a laborious process that required hand transcriptions or photocopies of sheaves of papers. Today, this data exists in electronic format and is easy to access, copy, sell, ship, consolidate, and alter. Privacy advocates point out the potential for misusing data that has been collected and stored in computer databases. They are encouraging lawmakers to restrict the sale and distribution of information about individuals. One proposal would require your permission before information about you can be distributed.

However, the wisdom of such a proposal has been questioned, and not just by corporate interests. Information about you is not necessarily "yours." Although you might disclose information about yourself on an application form, other information about you is collected without your direct input. For example, suppose you default on your credit card payments. The credit card company has accumulated information on your delinquent status. Shouldn't it have the freedom to distribute this information, for example, to another credit card company? Balancing privacy with freedom of speech is a tricky issue in the Information Age.

What do you think?

1. Can you identify an actual incident when you discovered that data about you had been distributed without your approval? ○ Yes ○ No ○ Not sure

2. Do you accurately fill out all the questionnaires that you encounter on the Web? ○ Yes ○ No ○ Not sure

3. Do you think that you have a right to be consulted before anyone distributes information about you? ○ Yes ○ No ○ Not sure

Save It!

QuickCheck A

1. A(n) __________ database is able to link the records from two or more tables and treat them as a single unit.

2. True or false? To access databases on the Web, you'll have to purchase database software. __________

3. To create your own databases, you must first design the file __________ by specifying the names for each data field.

4. True or false? The location of a GPS-equipped cell phone can be electronically triangulated even when it is turned off. __________

5. A basic __________ tag stores a unique serial number that can be transmitted to a reader device and cross-checked against a database.

Check It!

QuickCheck B

Carefully examine the entries in the database. Give each record indicated by an arrow an **A** if it meets the criteria described on page 173 for accurate and consistent data. Otherwise, give it an **F**.

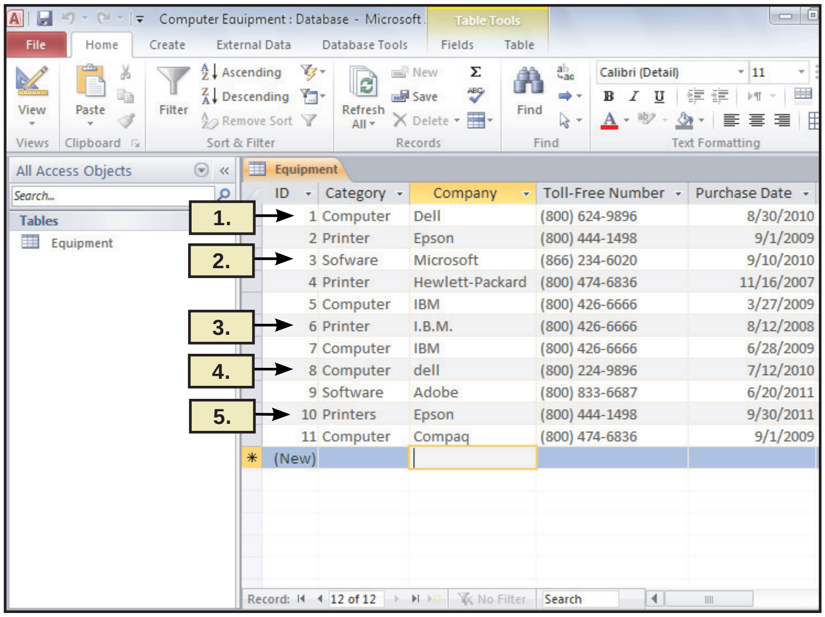
1. __________

2. __________

3. __________

4. __________

5. __________


Computer Equipment : Database - Microsoft
Table Tools
File
Home
Create
External Data
Database Tools
Fields
Table
View
Paste
Filter
Ascending
Descending
Remove Sort
Refresh All
New
Save
Delete
Find
Calibri (Detail)
11
Views
Clipboard
Sort & Filter
Records
Find
Text Formatting
All Access Objects
Search...
Tables
Equipment
1.
2.
3.
4.
5.
Record: 12 of 12
No Filter
Search

ID	Category	Company	Toll-Free Number	Purchase Date
1	Computer	Dell	(800) 624-9896	8/30/2010
2	Printer	Epson	(800) 444-1498	9/1/2009
3	Sofware	Microsoft	(866) 234-6020	9/10/2010
4	Printer	Hewlett-Packard	(800) 474-6836	11/16/2007
5	Computer	IBM	(800) 426-6666	3/27/2009
6	Printer	I.B.M.	(800) 426-6666	8/12/2008
7	Computer	IBM	(800) 426-6666	6/28/2009
8	Computer	dell	(800) 224-9896	7/12/2010
9	Software	Adobe	(800) 833-6687	6/20/2011
10	Printers	Epson	(800) 444-1498	9/30/2011
11	Computer	Compaq	(800) 474-6836	9/1/2009
(New)				

Check It!

Get It? While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 12.

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CHAPTER 13

Making Presentations

What's Inside?

Chapter 13 focuses on creating and delivering computer-supported presentations in settings such as classes, meetings, clubs, committees, and fundraisers. Using computer software designed for presentations, you can create a compelling and effective visual backdrop that helps your audience pay attention and understand your key points.

- **FAQs:**

  - How do I create effective visuals for a presentation? 185
  - How do I choose the right colors, graphics, and fonts for my slides? 186
  - Should I use transitions and animations? 187
  - How do I finalize a presentation? 188
  - How do I deliver a presentation? 189
- **Hardware:** Computer projection devices 190
- **Project:** Explore presentation software 193
- **Issue:** Is it the medium or the message? 196
- **QuickChecks** 197

What's on the CD?

Chapter 13 walks you through the key activities for creating computer-supported presentations. In addition, a video shows you how to set up presentation equipment.

- Discover how to create slides for a presentation 185
- Learn how to select a theme that supports your message 186
- Take a tour of slide transitions and animation effects 187
- Learn how to work with speaker notes 188
- Find out how to output your presentation as a video 189
- See how to set up a computer projection device 190

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FAQ How do I create effective visuals for a presentation?

Presentation software, such as Microsoft PowerPoint and OpenOffice Impress, can help you create the visual backdrop for speeches, lectures, and demonstrations. A presentation consists of slides that can be viewed on a computer monitor, large screen TV, or projection screen.

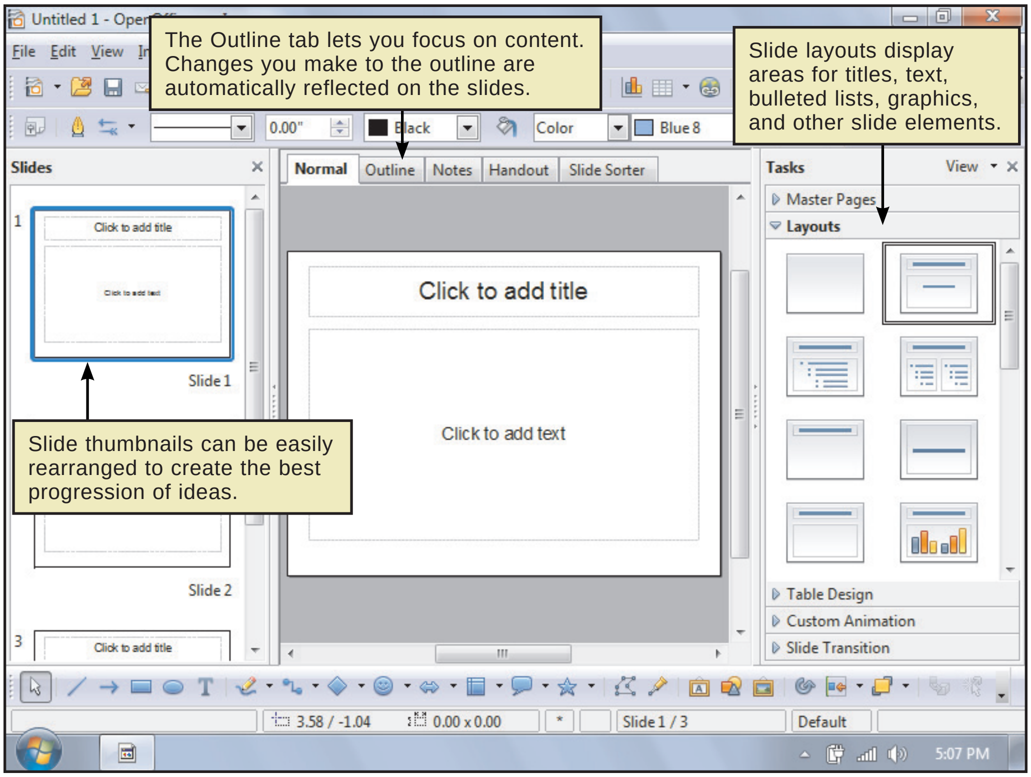
A **presentation slide** can contain text, graphics, and audio elements. Each slide usually has a title. A few simple bullet items can be used to present key concepts. Numbered lists can present the steps in a process. Tables, charts, or graphs can simplify complex ideas and present numerical or statistical data. Diagrams can illustrate processes or devices. Photos and videos can make your ideas seem concrete. Slides can even contain video and audio clips. When creating a presentation, use the elements that best help your audience understand the information you want to convey.

You can create a presentation simply by generating a series of slides, or you can begin by using the outlining feature of your presentation software to work on the progression of ideas that you want to present. Your outline can then be converted into slides.

Making a slide is easy. Your presentation software offers a variety of **slide layouts** that help you place titles, text, lists, graphs, photos, and other elements. You can easily insert, delete, and rearrange slides until your presentation is just right. Click the Try It! button to find out how to select slide layouts and add elements, such as titles, bulleted lists, and graphics.

Try It!

Figure 13-1


Untitled 1 - OpenOffice
File Edit View In
0.00"
Black
Color
Blue 8
Slides
Normal
Outline
Notes
Handout
Slide Sorter
Tasks
View
Master Pages
Layouts
Click to add title
Click to add text
Slide 1
Slide 2
Table Design
Custom Animation
Slide Transition
3.58 / -1.04
0.00 x 0.00
Slide 1 / 3
Default
5:07 PM

The Outline tab lets you focus on content. Changes you make to the outline are automatically reflected on the slides.

Slide layouts display areas for titles, text, bulleted lists, graphics, and other slide elements.

Slide thumbnails can be easily rearranged to create the best progression of ideas.

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FAQ How do I choose the right colors, graphics, and fonts for my slides?

The slides in a presentation can be unified by colors, formats, and styles. Most presentation software provides a variety of options for the "look" of your slides. These options are called themes, templates, or Quick Styles, depending on the presentation software you're using.

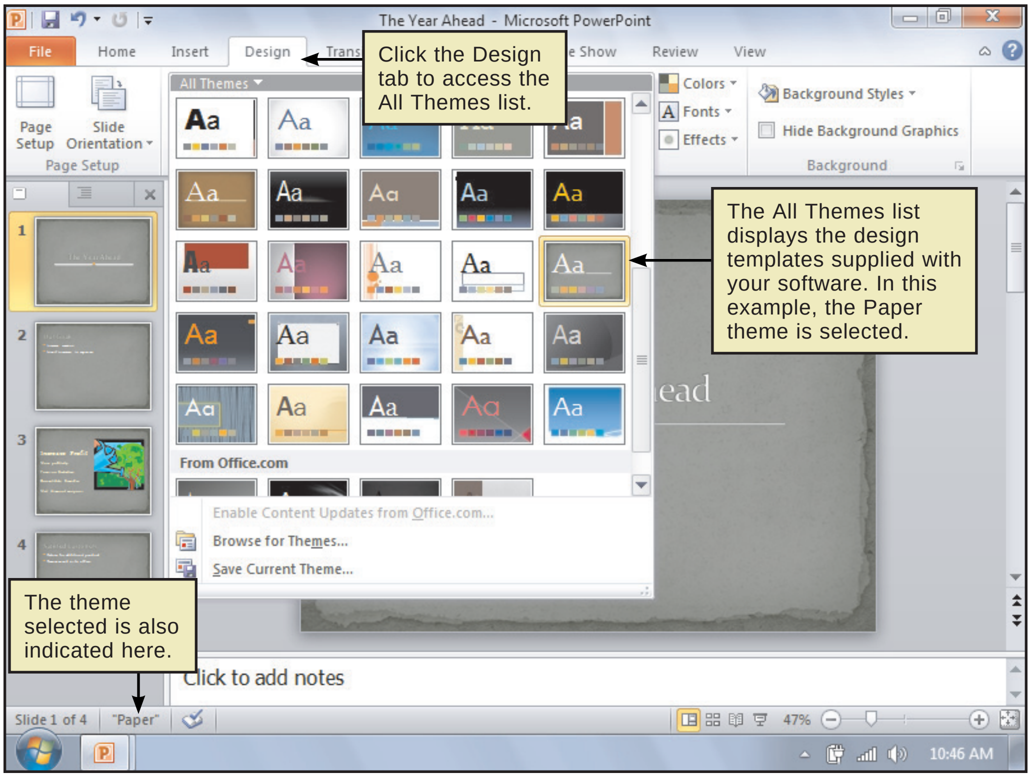
Themes simplify the process of creating a presentation by providing ready-made, professional-looking background graphics, fonts, and other visual elements, designed to complement each other.

Themes can support the message you want your presentation to communicate. When you select a theme, consider the point you want to make and the image you want to convey. Bright colors and snappy graphics, for example, tend to convey a more casual approach than somber colors. If you don't find a suitable theme, you can create one from scratch or you can modify a predefined theme.

Professionally-designed themes are suitable for most presentation venues. You should, however, make sure you are using a font size that can be easily seen by your audience. When selecting font sizes, consider the size of the room, the size of your presentation screen, and the distance between your audience and the screen. You can select a theme for your slides when you first create a new presentation, or you can apply a theme after you've entered the content of your slides. Click the Try It! button to see how to select a theme.

Try It!

Figure 13-2


The Year Ahead - Microsoft PowerPoint
File
Home
Insert
Design
Trans
e Show
Review
View
Page Setup
Slide Orientation
Page Setup
All Themes
Colors
Fonts
Effects
Background Styles
Hide Background Graphics
Background
From Office.com
Enable Content Updates from Office.com...
Browse for Themes...
Save Current Theme...
ead
Click to add notes
Slide 1 of 4
"Paper"
47%
10:46 AM

Click the Design tab to access the All Themes list.

The All Themes list displays the design templates supplied with your software. In this example, the Paper theme is selected.

The theme selected is also indicated here.

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FAQ Should I use transitions and animations?

A **transition effect** specifies how a slide replaces the previous slide during a presentation. Transitions include fades, wipes, and dissolves. You can also select sound effects to accompany a transition. If you do not specify a transition, the current slide simply cuts to a new slide.

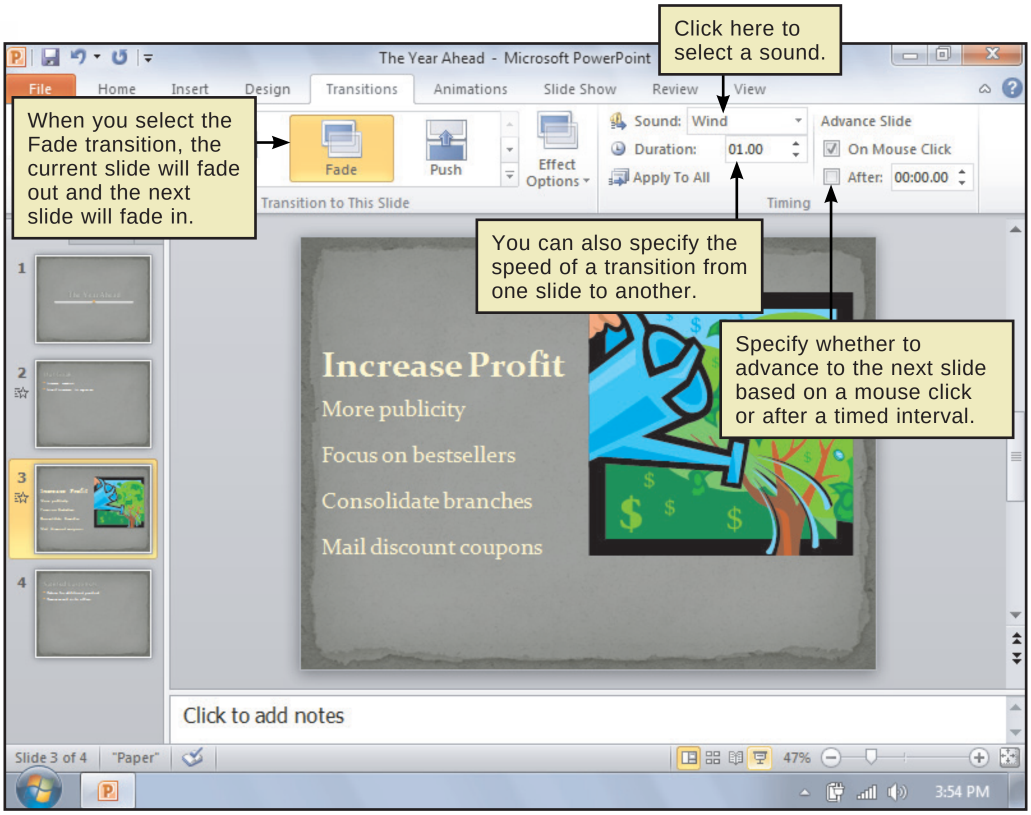
An **animation effect** adds motion to slide elements, such as titles or bulleted list items. A frequently-used animation effect makes bulleted list items glide onto a slide one by one under the control of the person delivering the presentation. Other effects include enlarging, shrinking, and spinning.

Transitions and animations can be set to occur when you click a mouse button or press a key during a presentation. They can also be set to occur automatically after a specified period of time. Use the automatic settings when a transition or animation does not have to coordinate with a specific statement you make during the presentation.

It is easy to get carried away with spiffy transitions and animations; but after the fourth slide that spins onto the screen accompanied by blaring trumpets or your favorite rap ring tone, the audience might get a bit irritated. Use transitions and animations sparingly for highlighting the most important points or for a change of pace during the more lengthy segments of your presentation. Click the Try It! button for a demonstration of handy transitions and animation effects.

TryIt!

Figure 13-3


The Year Ahead - Microsoft PowerPoint
File
Home
Insert
Design
Transitions
Animations
Slide Show
Review
View
Fade
Push
Effect Options
Transition to This Slide
Apply To All
Advance Slide
Timing
1
The Year Ahead
2
3
4
Slide 3 of 4
"Paper"
47%
3:54 PM

Sound: Wind

Duration: 01.00

☑ On Mouse Click

☐ After: 00:00.00

Increase Profit

More publicity

Focus on bestsellers

Consolidate branches

Mail discount coupons

Click to add notes

Click here to select a sound.

When you select the Fade transition, the current slide will fade out and the next slide will fade in.

You can also specify the speed of a transition from one slide to another.

Specify whether to advance to the next slide based on a mouse click or after a timed interval.

FAQ How do I finalize a presentation?

Presentations are designed for various purposes. Some presentations are intended to convey information, whereas others are designed to convince the audience of your point of view. Avoid pitfalls that will reduce the credibility of your presentation. Make sure you check spelling and grammar on every slide. In addition, check your facts to make sure they are accurate.

The slides in your presentation should reinforce the ideas that you want to present; they are not the script for your presentation. If all you do is read your slides to your audience, your presentation will be very dull. You should plan to embellish your presentation with additional facts and comments. To remember what you want to say, you can add **speaker notes** to each slide.

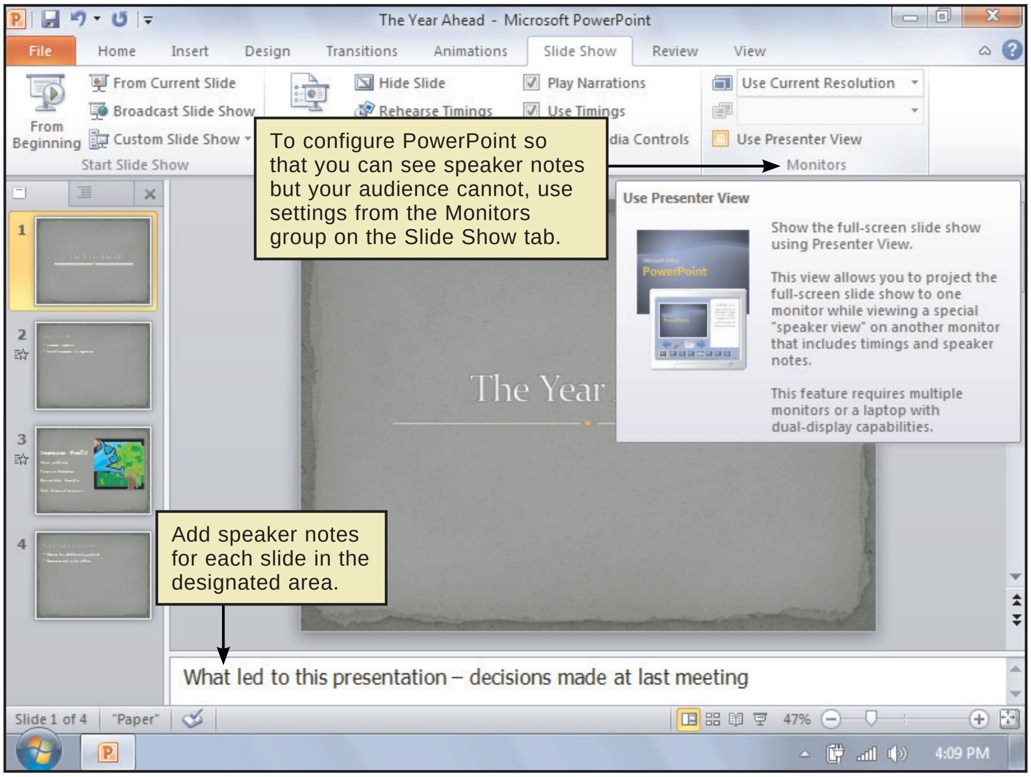
Your presentation software provides various ways to print speaker notes for reference during a presentation. You can print them in the form of a script. Alternatively, you can print each slide with its corresponding speaker notes.

Your presentation software is also likely to offer a way to show your speaker notes on your computer screen, but display the notes-free slides on the projected image that's seen by the audience. To set up dual displays, Windows has to be configured to support two monitors. Additional settings might be required from within the presentation software. With PowerPoint, for example, use the Monitors group on the Slide Show tab to select the Presenter View.

Speaker notes not only remind you of what you want to say about a slide, they also help you maintain good rapport with your audience because you don't have to look at the projected slides behind you. The Try It! for Figure 13-4 helps you explore speaker notes.

Try It!

Figure 13-4


The Year Ahead - Microsoft PowerPoint
File
Home
Insert
Design
Transitions
Animations
Slide Show
Review
View
From Beginning
From Current Slide
Broadcast Slide Show
Custom Slide Show
Start Slide Show
Hide Slide
Rehearse Timings
Play Narrations
Use Timings
dia Controls
Use Current Resolution
Use Presenter View
Monitors
The Year
Slide 1 of 4
"Paper"
47%
4:09 PM

To configure PowerPoint so that you can see speaker notes but your audience cannot, use settings from the Monitors group on the Slide Show tab.

Use Presenter View

Show the full-screen slide show using Presenter View.

This view allows you to project the full-screen slide show to one monitor while viewing a special "speaker view" on another monitor that includes timings and speaker notes.

This feature requires multiple monitors or a laptop with dual-display capabilities.

Add speaker notes for each slide in the designated area.

What led to this presentation – decisions made at last meeting

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FAQ How do I deliver a presentation?

Typically, you will deliver presentations using your presentation software's Slide Show view. This view hides the toolbars, ribbons, and other controls you used to create the presentation, and displays each slide at the full size of the screen. You can use the mouse button or arrow keys to move from one slide to the next.

To highlight important information, you can write on slides during the presentation. When using PowerPoint, for example, select a pen or highlighter from the Pointer Options menu by right-clicking the slide. Hold down the left mouse button and drag the pointer to write on the slide.

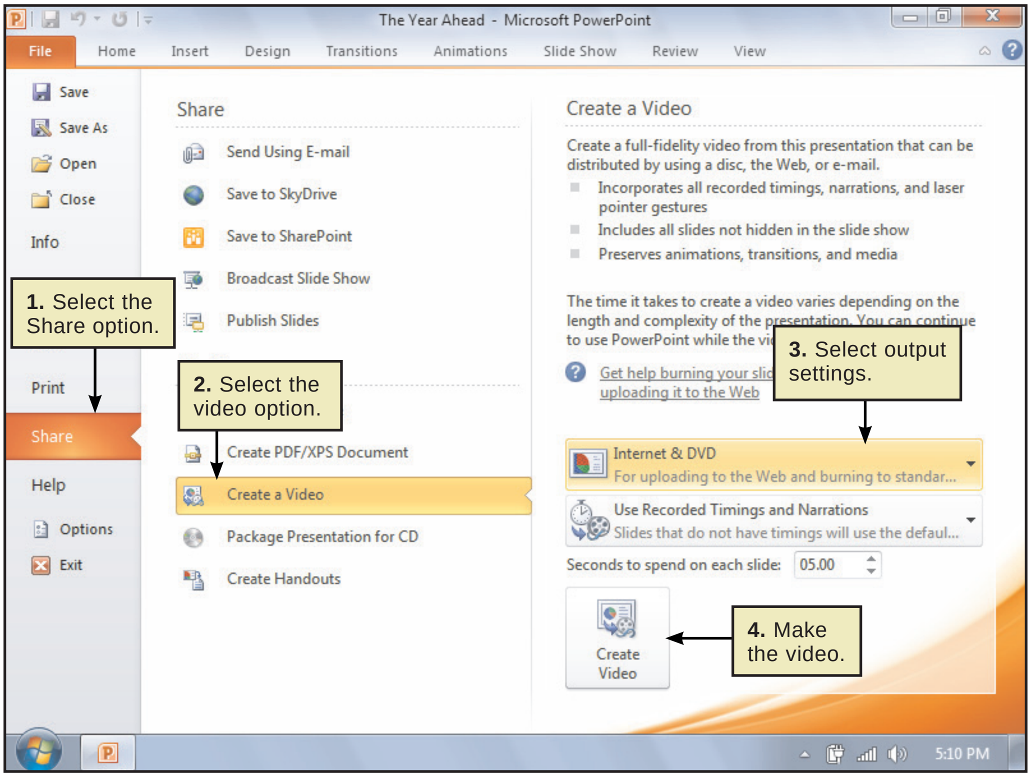
You can also use options in your presentation software to output your slides as overhead transparencies. You can package your presentation on a CD. You can print your slides on paper and distribute them as handouts. You can even use Windows Movie Maker, third-party software, or Web services to convert a presentation into a YouTube video.

Some presentation software gives you the option of showing presentations using a viewer instead of the full presentation software product. For example, a program called PowerPoint Viewer displays presentations on computers on which PowerPoint is not installed. PowerPoint presentations can also be converted into PDF format, which can be viewed on any computer with Adobe Reader installed.

Some presentation software converts slides to HTML pages that you can post on the Web, but these pages typically do not incorporate transitions and animations. With PowerPoint, however, you can save the presentation as a video that includes transitions, animations, and sounds. These PowerPoint videos can then be posted on the Web. Click the Try It! button to find out how to turn a PowerPoint presentation into a video.

Try It!

Figure 13-5



The Year Ahead - Microsoft PowerPoint
File
Home
Insert
Design
Transitions
Animations
Slide Show
Review
View
Save
Save As
Open
Close
Info
Print
Share
Help
Options
Exit
Share
Send Using E-mail
Save to SkyDrive
Save to SharePoint
Broadcast Slide Show
Publish Slides
Create PDF/XPS Document
Create a Video
Package Presentation for CD
Create Handouts
Create a Video
Get help burning your slid
uploading it to the Web
Create Video
5:10 PM

Create a full-fidelity video from this presentation that can be distributed by using a disc, the Web, or e-mail.

- Incorporates all recorded timings, narrations, and laser pointer gestures
- Includes all slides not hidden in the slide show
- Preserves animations, transitions, and media

The time it takes to create a video varies depending on the length and complexity of the presentation. You can continue to use PowerPoint while the vi

Internet & DVD
For uploading to the Web and burning to standar...

Use Recorded Timings and Narrations
Slides that do not have timings will use the defaul...

Seconds to spend on each slide: 05.00

1. Select the Share option.

2. Select the video option.

3. Select output settings.

4. Make the video.

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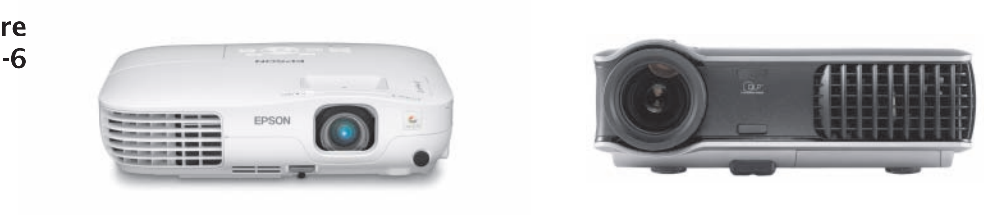
Hardware

Computer projection devices

You can display the slides for a presentation on a PC screen for a one-on-one or small group presentation. For large groups, a **computer projection device** can display your slides on a wall screen in a conference room or theater.

Figure 13-6



Computer projection devices are commonly used in schools, libraries, and businesses. You are likely to have an opportunity to use one—for example, when you pitch a new publicity campaign to your company's best client; when you give an oral report in your anthropology class; when you brief volunteers for the United Way campaign; or even when you're trying to convince the city council to put some effort into urban renewal. Two types of projection devices popular today are LCD projectors and DLP projectors.

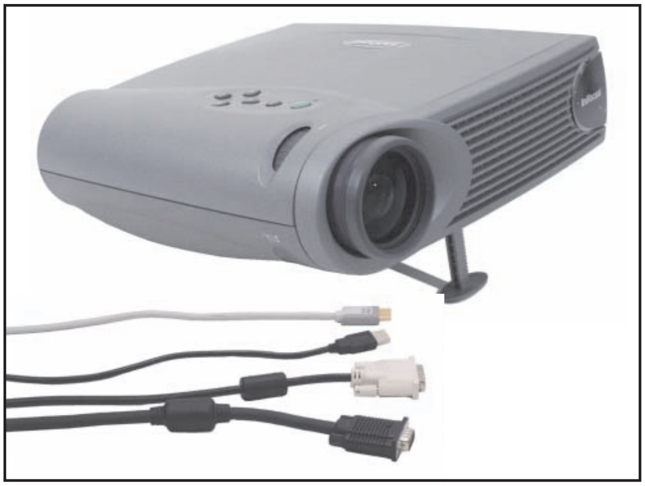
An **LCD projector** shines a bright light through a small LCD (liquid crystal display) panel. The LCD contains a matrix of tiny elements that form the colors for an image. Light is projected through the LCD matrix to generate a large image on a wall or screen.

A **DLP projector** shines a bright light onto an array of miniature mirrors. The mirrors rotate to create different colored dots on the projected image. DLP projectors have a reputation for smooth, jitter-free images, with good contrast and less screen-door effect than LCD projectors. **Screen-door effect** refers to the perception that the pixels in an image are surrounded by a thin black border, giving the impression that you are looking through a fine mesh screen. Prices for computer projection devices are US$300 and up, with DLP projectors costing a bit more than LCD projectors with similar features.

Projection devices connect to computers, standalone DVD players, and cable television converter boxes. A variety of connecting cables are generally supplied with every projector; the types of cables depend on the type of video signals the projector accepts.

Play It!

Figure 13-7



When connecting a projector to your computer, you usually have a choice of using DVI, HDMI, or VGA connectors. DVI and HDMI are digital ports and produce the best quality output. Use digital ports if you have them on your computer and projector. Click the Play It! button to find out how to connect an LCD projector to a notebook PC.

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Hardware

(continued)

Factors that affect the price of LCD and DLP projectors include brightness, resolution, and portability. The brightness of a projection device is measured in lumens, sometimes expressed as ANSI lumens. Projection devices with higher lumen ratings produce a brighter picture and can be more easily viewed in rooms with ambient light. A projector with less than 2,000 lumens is best used in a dark room.

Image resolution refers to the number of pixels that can be displayed by the projection device. As is the case with most computer screens, higher resolution projection devices typically cost more than those with lower resolutions. Basic computer projection devices support either SVGA (800 x 600), XGA (1024 x 768), or WXGA (1280 x 800) resolution. Projectors with SXGA+ (1400 x 1050) or UXGA (1600 x 1200) resolution are also available and work well for displaying detailed engineering drawings and spreadsheets.

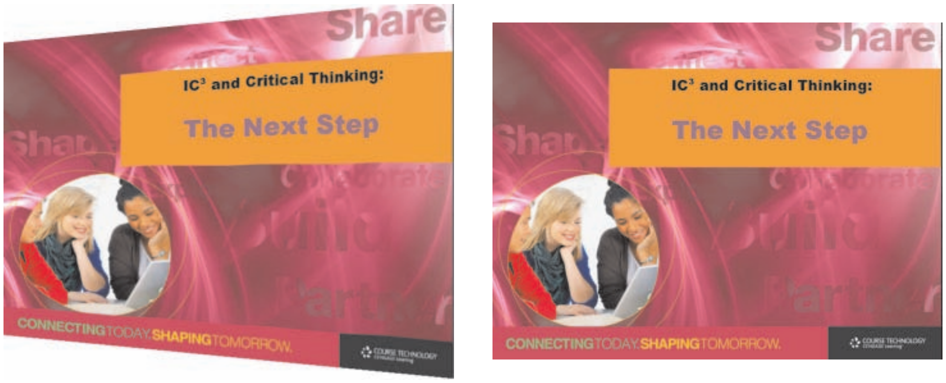
As a rule of thumb for PowerPoint presentations, look for a projector that has the same resolution as your computer screen. You can lower the resolution on your computer to match a low resolution projector, but if your projector resolution is higher than your computer screen the interpolated image will tend to appear fuzzy.

Smaller and lighter projection devices normally cost more than larger, heavier devices with similar specifications. Many portable projection devices—those designed to be carried from presentation to presentation—weigh less than five pounds. Projectors suitable for portable or fixed applications weigh in at seven to ten pounds. Heavier units are intended for permanent installations.

While many projection devices are used for training and group presentations, video buffs have discovered that LCD or DLP projectors work very well as large screen projection devices for home theaters. Even a mid-range laptop computer with a DVD drive can serve as the core of a home theater system when connected to a set of large speakers and a projection device.

Computer projection devices can include bells and whistles to enhance presentations, such as built-in speakers, remote controls, and built-in CD/DVD players. Keystone control is available on most projector models. **Keystoning**, the bane of professional speakers and audio-visual specialists, is the tendency of projected images to appear more like trapezoids than true rectangles. It occurs when the projector is not positioned directly in line with the middle of the screen. Because it is often practical to mount the projector on a table that's lower than the screen or on the ceiling above the screen, keystoning is a common artifact of presentations. Keystone control compensates for the position of the projector to produce a professional-looking rectangular image.

Figure 13-8


Share
IC³ and Critical Thinking:
The Next Step
CONNECTING TODAY. SHAPING TOMORROW.
Share
IC³ and Critical Thinking:
The Next Step
CONNECTING TODAY. SHAPING TOMORROW.

Projected image has keystoning.

Keystone control squares off the image.

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Hardware
(continued)

Technology is great—when it works. But it doesn't always work. Occasional problems with your PC can affect your personal productivity, but technology glitches can become very public when you depend on presentation equipment. It's awfully nerve-wracking to stand in front of a group of 100 people while someone tries to track down a replacement bulb for the LCD projector. You can avoid many of the curveballs that technology throws your way if you get serious about planning and preparing for your presentation:

- **Determine whether presentation equipment will be available.** If you plan to use your own notebook computer, make sure it is compatible with the projection device and that the correct connecting cables will be supplied. If you intend to use a computer other than your own, make sure the necessary presentation software has been installed.
- **Check out the equipment ahead of time.** If possible, schedule a trial run the day before your presentation. Connect your computer and display a few slides so you are certain that everything works.
- **Make sure that your audience will be able to see and hear your presentation.** During your trial run, sit in the back of the room and be certain that the text on your slides is large enough to be easily read.
- **Arrive early.** Allow at least 30 minutes to set up your equipment and connect it to the presentation device.
- **Know how to get technical support.** If you are unfamiliar with any of the equipment, you might request the presence of a technical support person during your trial run or while you set up. Find out how you can contact a technician if you run into problems during the presentation.
- **Be prepared for problems.** Find out what to do if the projector bulb burns out. If you're using a notebook PC with batteries, keep your power cord handy. If this presentation can make or break your career, you might consider printing copies of your most important slides so that you can distribute them to your audience in case of a power failure.

Figure 13-9

Project

Explore presentation software

Presentation software is optimized to create slides containing text, sound effects, and graphics. You can design your slides from scratch, but you'll also find a good selection of ready-made slide templates that contain professionally-designed background graphics and fonts in sizes that are easy to read when projected on a wall screen.

Most office suites include a collection of clip art images that provide eye-catching additions to documents, spreadsheets, and slides. For a true multimedia presentation, you can add sound effects to your slides. You can incorporate even more visual interest by selecting active transition effects between slides, such as fades, wipes, and dissolves.

When you have completed the project, you should be able to:

- Select a slide template to use as the theme for your presentation.
- Create a slide with a bulleted list.
- Add an animation effect for the bulleted list.
- Add clip art to a slide.
- Select a transition effect.
- Add lecture notes for your script.

Requirements: This project requires Microsoft Windows 7 and presentation software, such as Microsoft PowerPoint or OpenOffice Impress.

The deliverable for this project is a three-slide presentation that includes:

1 A title slide
2 A second slide with a bulleted list
3 An animation effect for the bulleted list on the second slide
4 A third slide with clip art
5 A transition effect for all slides
6 Speaker notes for all slides

1. Open your presentation software.

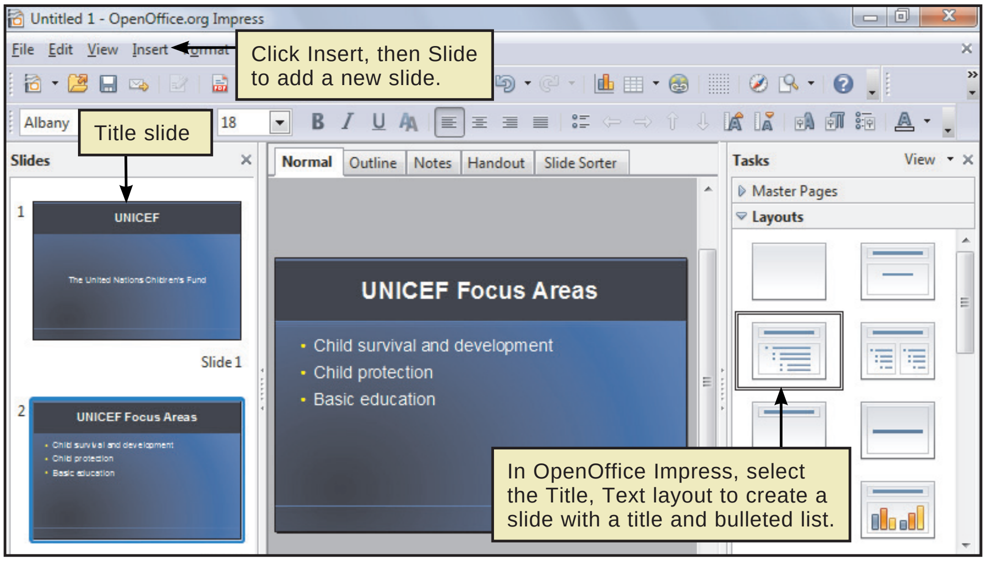
2. Suppose you want to create a presentation that explains why it is important to contribute to a charity such as UNICEF. Begin by choosing an appropriate template or theme for your presentation.
   a. In Microsoft PowerPoint, click the Design tab. Rest your pointer on a theme to get a preview of the theme on the default title slide. Click the up- or down-arrow buttons to display more themes. When you've found one you like, click it to select the theme.
   b. In OpenOffice Impress, use the Presentation Wizard. In Step 1 of the Wizard, choose From template, click the down-arrow button beside Presentations, and select Presentation Backgrounds. Select one of the options. In Step 2, select Slide for the output medium, then click the Create button. Select the Title Slide layout from the Layouts task pane after the wizard closes.

• Explore presentation software (continued)

3. Enter an appropriate title for your title slide, such as "UNICEF." Enter a subtitle, such as "The United Nations Children's Fund."

4. Add a new slide containing a title and bulleted list.
   a. In PowerPoint, click the Home tab, click the New Slide button, and select the *Title and Content* layout.
   b. In Impress, click the Insert menu, then select Slide. When the new slide is displayed, select the Title, Text layout from the Layouts task pane.

5. Type a title and enter your bulleted items. Compare your slide to the example below. If you make any mistakes and you want to delete a slide, you can select the slide in the Slides task pane and press the Delete key on the keyboard.


Untitled 1 - OpenOffice.org Impress
File Edit View Insert Format
Albany
18
Slides
Normal Outline Notes Handout Slide Sorter
Tasks View
Master Pages
Layouts
Slide 1

Click Insert, then Slide to add a new slide.

Title slide

UNICEF

The United Nations Children's Fund

UNICEF Focus Areas
- Child survival and development
- Child protection
- Basic education

In OpenOffice Impress, select the Title, Text layout to create a slide with a title and bulleted list.

6. Add an animation effect to the bulleted list. Click to position the insertion point within the bulleted list.
   a. In PowerPoint, click the Animations tab. Select an animation from the Animation Styles list.
   b. In Impress, from the Custom Animation task pane, click the Add button, select an effect, then click the OK button.

7. Create a new slide containing graphics and text.
   a. In PowerPoint, click the New Slide button and select the *Content with Caption* layout. Click the Clip Art button in the Content area of the slide. Type a subject in the Clip Art task pane search box—**children**, for example—and then click the Go button. Select your clip art, then close the Clip Art task pane.
   b. In Impress, click the Insert menu, then select Slide. Select the *Title, Clipart, Text* layout. Double-click the graphics box. Select an image from the Sample Pictures folder in the Pictures library.

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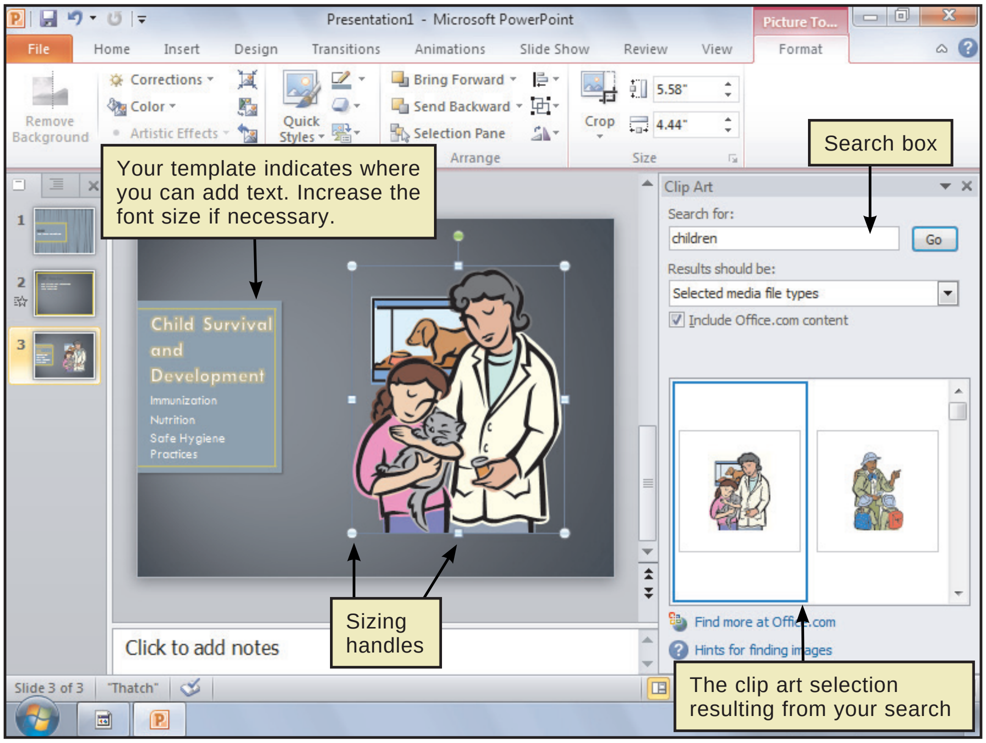
• Explore presentation software (continued)

8. Resize the graphic as necessary by dragging the sizing handles. **Sizing handles** are small squares or circles at the corners and sides of a graphic used for resizing the graphic.

9. Enter a title for your slide and add appropriate text, as in the example below.


Presentation1 - Microsoft PowerPoint
Picture To...
File
Home
Insert
Design
Transitions
Animations
Slide Show
Review
View
Format
Remove Background
Corrections
Color
Artistic Effects
Quick Styles
Bring Forward
Send Backward
Selection Pane
Arrange
Crop
5.58"
4.44"
Size
Clip Art
Go
Results should be:
Find more at Office.com
Hints for finding images
Child Survival and Development
Immunization
Nutrition
Safe Hygiene Practices
Click to add notes
Slide 3 of 3
"Thatch"

Search for: children

Selected media file types

☑ Include Office.com content

Search box

Your template indicates where you can add text. Increase the font size if necessary.

Sizing handles

The clip art selection resulting from your search

10. Apply a slide transition effect to all your slides.
  a. In PowerPoint, click the Transitions tab. Select a transition, then click the Apply To All button in the Timing group.
  b. In Impress, select a transition from the Slide Transition pane. Scroll to the bottom of the pane, then click the *Apply to All Slides* button.

11. Add speaker notes to all your slides. In Impress, click the Notes tab above your current slide.

12. View your slide show. In PowerPoint, click the Slide Show tab, then click the From Beginning button. In Impress, click the Slide Show menu, then click Slide Show. Save your file as **Project 13 [Your Name]**.

13. E-mail your presentation to your instructor by using your presentation software's send e-mail feature. Access Help if necessary. You can also manually send the file as an e-mail attachment. Close all windows when you're done.

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Issue

Is it the medium or the message?

A Canadian professor named Marshall McLuhan coined the phrase “the medium is the message” to express the idea that media, such as films, books, and television, have an impact far greater than that of the material they communicate. Suppose you’re surfing the Web and you encounter a site with light pink text. This site might as well carry no message as far as you’re concerned. You might skip it because the text is too difficult to read. A clear case of the medium (that awful light pink text) becoming the message (don’t bother).

“The medium is the message” is not, however, the last word of advice for people who create documents, spreadsheets, and presentations. It would be a miscalculation to believe that your content doesn’t matter as long as it is wrapped up in a flashy package. Today’s media-savvy audience members might be entertained by flash, but they can easily penetrate its thin veil to critically examine your ideas.

Growing up in a world of fast-paced multimedia creates certain expectations about the pace and format of information. Some cultural anthropologists hypothesize that today’s media mix might affect the evolution of individuals and cultural groups. Children exposed to the fast-paced media blitz of music videos, pop music, and special effects may be developing psychological coping mechanisms that are quite different from their parents and grandparents, who spent time with books, magazines, and newspapers.

While print allows time for reflection and constructing mental images to supplement words on a page, the rapidly changing collage of TV, video game, and Web-based images requires participants to develop quite a different set of mental skills.

Today, effectively conveying a message takes a variety of skills. Good presenters need to understand how to use electronic tools provided by software and digital devices, but they also need to consider the perceptions and psychology of their audience.

What do you think?

1. Do you believe that McLuhan was correct in saying that “the medium is the message”? ○ Yes ○ No ○ Not sure

2. Do you agree that, as a rule of thumb, the time you devote to preparing for a presentation should be divided as 50% research and writing, and 50% designing electronic slides? ○ Yes ○ No ○ Not sure

3. Do you believe that electronic media can fundamentally change the personality and thought patterns of an entire generation? ○ Yes ○ No ○ Not sure

Save It!

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QuickCheck A

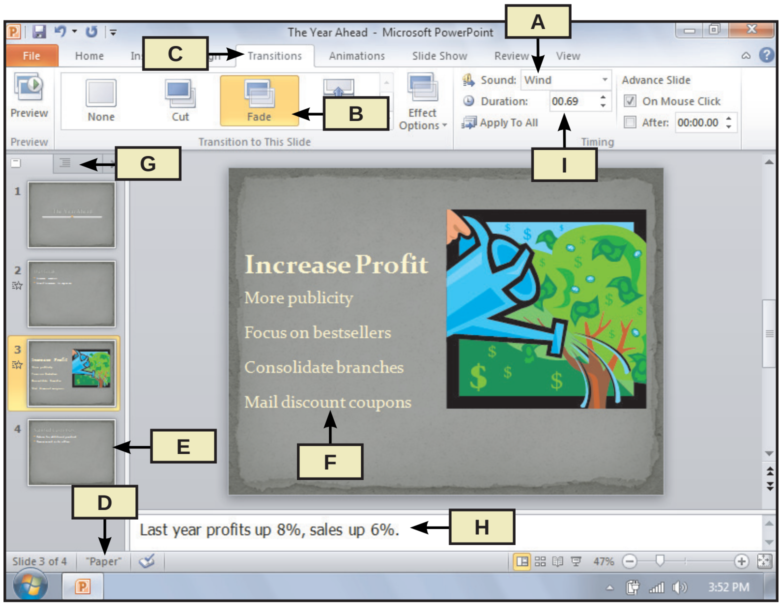
1. Fades, wipes, and dissolves are examples of ________ effects, which determine how a slide replaces the previous slide in a presentation.
2. Speaker ________ that you add to your slides can form the script for your presentation.
3. Most projection devices use either LCD or ________ technology.
4. True or false? Presentation software typically provides an option for converting presentations into HTML format for the Web. ________
5. True or false? Selecting the right theme can support the message you want your presentation to communicate. ________

CheckIt!

QuickCheck B

Indicate the letter that correctly matches each description.

1. A transition effect ________
2. Speaker notes ________
3. The theme ________
4. A sound effect ________
5. The speed of a transition from one slide to another ________


A
B
C
D
E
F
G
H
I
The Year Ahead - Microsoft PowerPoint
File
Home
Transitions
Animations
Slide Show
Review
View
Preview
None
Cut
Fade
Effect Options
Transition to This Slide
Apply To All
Advance Slide
Timing
Slide 3 of 4
"Paper"
47%
3:52 PM

Sound: Wind

Duration: 00.69

☑ On Mouse Click

☐ After: 00:00.00

Increase Profit

More publicity

Focus on bestsellers

Consolidate branches

Mail discount coupons

Last year profits up 8%, sales up 6%.

CheckIt!

GetIt? While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 13.

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CHAPTER 14

Recording and Editing Sound

What's Inside?

Music, sound effects, and speech are important features of our environment. Therefore, it seems natural for PCs to have audio capabilities that provide feedback, entertainment, and education. In Chapter 14, you'll learn how your PC generates audio and how to incorporate audio in your own projects.

- **FAQs:**

  - How does audio capability enhance my PC? 199
  - How does my PC record, store, and play digital audio? 200
  - What do I need to know about converting music files? 201
  - What should I know about MIDI? 202
  - How do computers recognize and generate speech? 203
- **Hardware:** Audio devices 204
- **Project:** Explore digital sound 207
- **Issue:** Can I copy it? 210
- **QuickChecks** 211

What's on the CD?

Because sound is the topic of Chapter 14, you'll get the most benefit from Chapter 14 software tours and videos if your PC is equipped for sound and you have speakers or headphones.

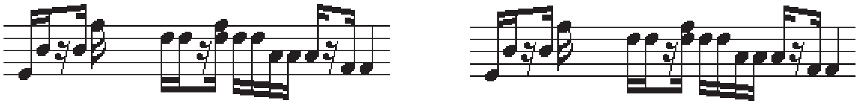
- Compare digital audio and MIDI 199
- Compare the quality of different digital sampling rates 200
- Learn how to rip tracks from a CD 201
- Find out how to compose MIDI music 202
- Discover what it's like to listen to your screen 203

FAQ How does audio capability enhance my PC?

Sound adds dimension to your computing experience. Beeps and other sound effects provide feedback as you use your PC, alerting you to error messages and other important events. Music lovers can connect to their favorite music store on the Web and listen to sample tracks. Sound effects can enliven business presentations. Children can listen while their PCs read stories. Computer game enthusiasts can hear a riot of sound effects as monsters attack, grenades explode, and tanks rumble past war-torn computerscapes. Individuals with visual disabilities can also gain access to computers through technology that reads aloud the content of a PC screen.

Computers work with two general categories of sound: digital audio and synthesized sound. **Digital audio** is a recording of real music, vocals, sound effects, or speech that has been converted into electronic signals, which a computer can then store, manipulate, and transmit. **Synthesized sound** has not been recorded from a live source, but instead has been generated by a machine—such as a computer. Click the Play It! buttons in Figure 14-1 and listen to digital audio and synthesized sound clips. Can you tell the difference?

Play It!



Play It!

Digital audio

Synthesized sound

Figure 14-1

Each category of sound has unique characteristics and applications. The table in Figure 14-2 offers an overview of digital audio and synthesized sound, designed to help you select the one that is most suitable for your projects.

Figure 14-2

	File Type	Characteristics	Popular Uses
Digital Audio	AAC and M4P	Good sound quality, small files	iTunes
	MP3	Good quality, small files	Digital music players; music downloads
	Wave	Good sound quality, but large files; supported in browsers without a plug-in	Background music for Web pages, recording your voice on your PC, ring tones
	WMA	Good quality, small files	Commonly used on Windows computers for recording and playback; Zune Marketplace downloads
	Ogg (Vorbis)	Free, open standard; supported by some browsers	Free music, Creative Commons files for Wikipedia
Synthesized Sound	MIDI	Synthesized sound, very small files	Digital instruments, backup music, movie and game sound effects, ring tones

FAQ How does my PC record, store, and play digital audio?

To create digital audio, you need a microphone and sound software, such as Windows Sound Recorder or open source Audacity. After you start the software, simply point the microphone at the sound source, and click the software's record button.

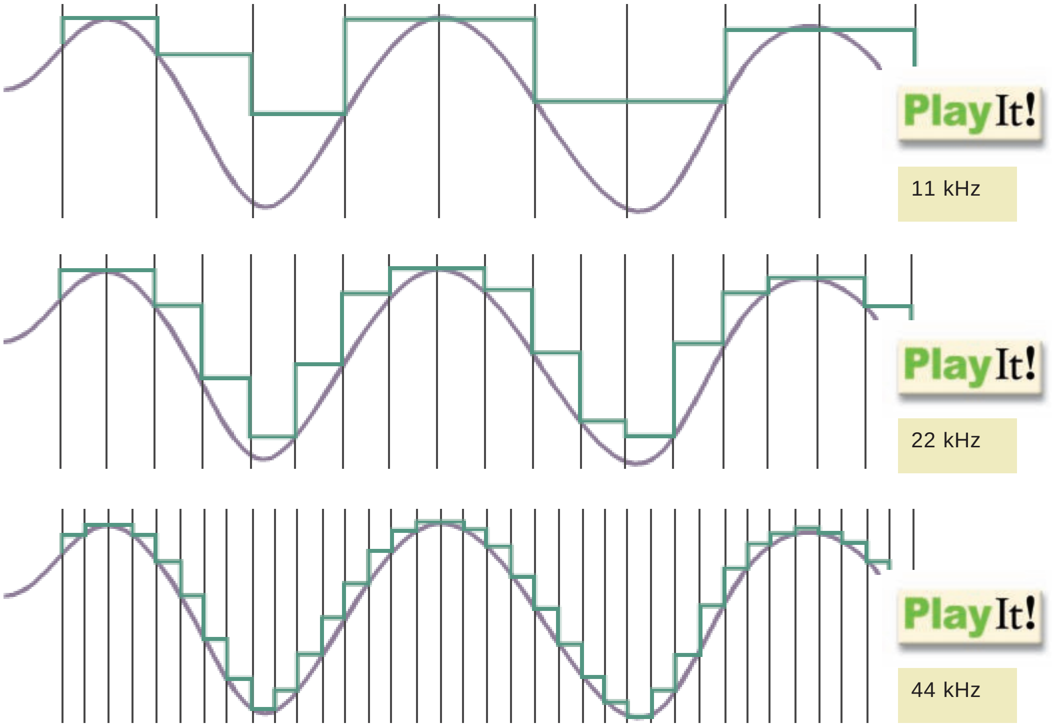
You probably know that a sound consists of energy waves, which your ears and brain detect as voices, music, and assorted sound effects. A sound wave provides information about a sound. The height of a wave indicates volume, technically called **amplitude**. The time between wave peaks indicates the sound's **frequency**—that is, whether it is a high note or a low note.

To digitally capture a sound wave, your PC periodically records a **sample** of the wave's amplitude as a binary number. A sequence of samples is stored as an audio file. The more samples your PC takes per second, the more accurately it can reproduce the wave.

Sampling rates are measured in kHz (kilohertz), where 1 kHz is 1,000 samples per second. An 11 kHz sampling rate produces fairly realistic digitized human speech. However, music requires sampling rates of 22 kHz or 44 kHz for good fidelity.

At higher sampling rates, digital audio samples (shown in green) more closely follow the shape of the sound wave (shown in purple). Click the Play It! buttons to compare the audio quality at each sampling rate.

Figure 14-3



Sampling creates big files. One minute of digitally recorded music requires about 10 MB of storage space when stored in Wave format, a popular "raw" or uncompressed audio file type. To shrink files to more manageable sizes, they can be converted into compressed audio file types, such as MP3, Ogg, or WMA. A 10 MB Wave file converted to MP3 requires only 1 MB. Compressed audio files have a slight loss of quality, but they are certainly more convenient for downloading and require far less storage space on portable music players.

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FAQ What do I need to know about converting music files?

Music comes from all sorts of devices such as computers, portable music players, car stereo systems, home theater systems, satellite radio, and your mobile phone. Audio formats from one of these devices might not work on others. For example, suppose you find a cool MIDI ring tone on the Web. It won't work on your iPhone unless you convert it into an MP3. And what about your favorite audio CD? If you want to listen to it on your iPod, you'll have to rip the tracks into MP3 or AAC format.

Ripping is a slang term that refers to the process of importing tracks from a CD or DVD to your computer's hard disk. The technical term for ripping is **digital audio extraction**. Ripping is handy if you have a CD and you'd like to move one or more tracks to your computer hard disk or a portable device, such as an iPod.

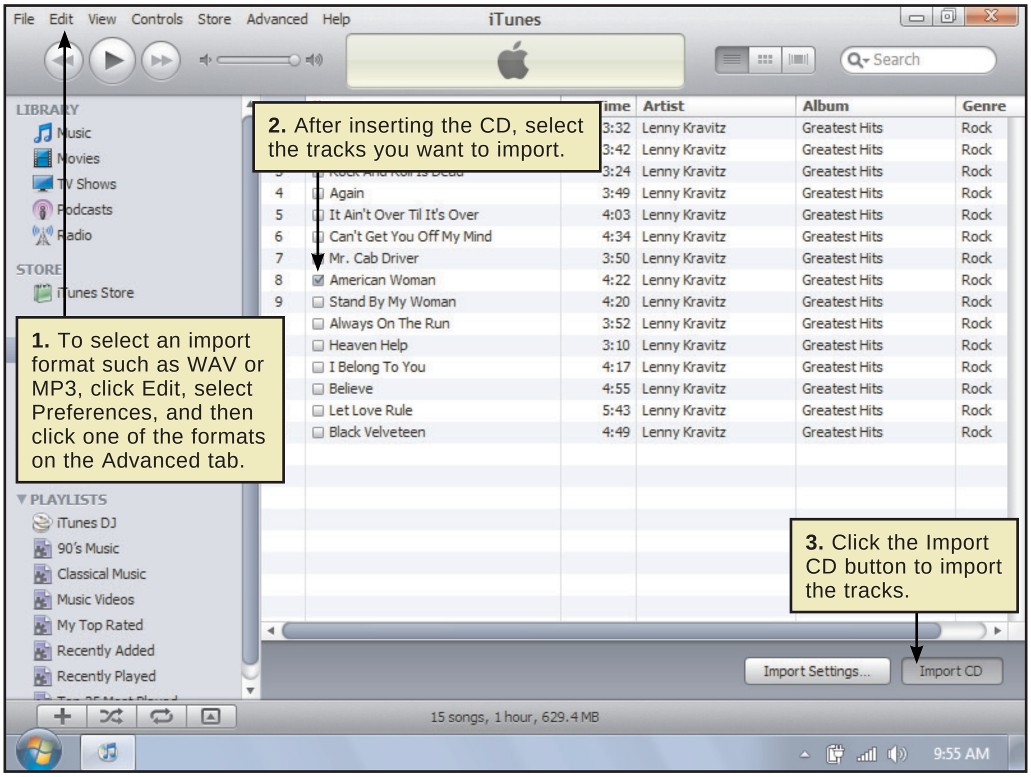
Music is stored on CDs in a digital format called **CD-DA** (Compact Disc Digital Audio). The format offers high fidelity; but as with Wave files, one minute of CD-DA music requires in excess of 10 MB of storage space. During the ripping process, music in CD-DA format is typically converted into a compressed format such as MP3, AAC, or WMA to reduce file size.

Many software tools are available for ripping CD tracks. One of the most versatile tools is Apple iTunes software. Windows Media Player, distributed with Microsoft Windows, also includes ripping routines.

In the United States, ripping music for personal use is controversial. Consumer advocates argue that it is acceptable "fair use," whereas representatives of the music industry maintain that ripping without permission is not legal. You are most likely acting legally if you rip tracks only from CDs that you have purchased, and keep the ripped versions for your own use. Click the Try It! button to learn how to rip tracks from a CD using iTunes software.

Try It!

Figure 14-4



1. To select an import format such as WAV or MP3, click Edit, select Preferences, and then click one of the formats on the Advanced tab.

2. After inserting the CD, select the tracks you want to import.

3. Click the Import CD button to import the tracks.

		ime	Artist	Album	Genre
		3:32	Lenny Kravitz	Greatest Hits	Rock
		3:42	Lenny Kravitz	Greatest Hits	Rock
		3:24	Lenny Kravitz	Greatest Hits	Rock
4	☐ Again	3:49	Lenny Kravitz	Greatest Hits	Rock
5	☐ It Ain't Over Til It's Over	4:03	Lenny Kravitz	Greatest Hits	Rock
6	☐ Can't Get You Off My Mind	4:34	Lenny Kravitz	Greatest Hits	Rock
7	☐ Mr. Cab Driver	3:50	Lenny Kravitz	Greatest Hits	Rock
8	☑ American Woman	4:22	Lenny Kravitz	Greatest Hits	Rock
9	☐ Stand By My Woman	4:20	Lenny Kravitz	Greatest Hits	Rock
	☐ Always On The Run	3:52	Lenny Kravitz	Greatest Hits	Rock
	☐ Heaven Help	3:10	Lenny Kravitz	Greatest Hits	Rock
	☐ I Belong To You	4:17	Lenny Kravitz	Greatest Hits	Rock
	☐ Believe	4:55	Lenny Kravitz	Greatest Hits	Rock
	☐ Let Love Rule	5:43	Lenny Kravitz	Greatest Hits	Rock
	☐ Black Velveteen	4:49	Lenny Kravitz	Greatest Hits	Rock

15 songs, 1 hour, 629.4 MB

FAQ What should I know about MIDI?

MIDI (Musical Instrument Digital Interface) specifies a standard way to store music data for synthesizers, electronic MIDI instruments, and computers. Unlike digital audio files, which contain digitized recordings of real music and voices, MIDI files contain a set of instructions—called **MIDI messages**—for synthesizing music based on the pitch, volume, and duration of each note made by each instrument. MIDI music is like a player piano roll that produces notes based on the position of punched holes, whereas digital audio is analogous to a tape recording.

To translate MIDI messages into music, most PCs use wavetable synthesis technology. **Wavetable synthesis** generates music by patching together a set of sounds that were prerecorded as individual notes from actual instruments. This set of sounds is sometimes referred to as a **patch set**. The larger the patch set, the more realistic the sound.

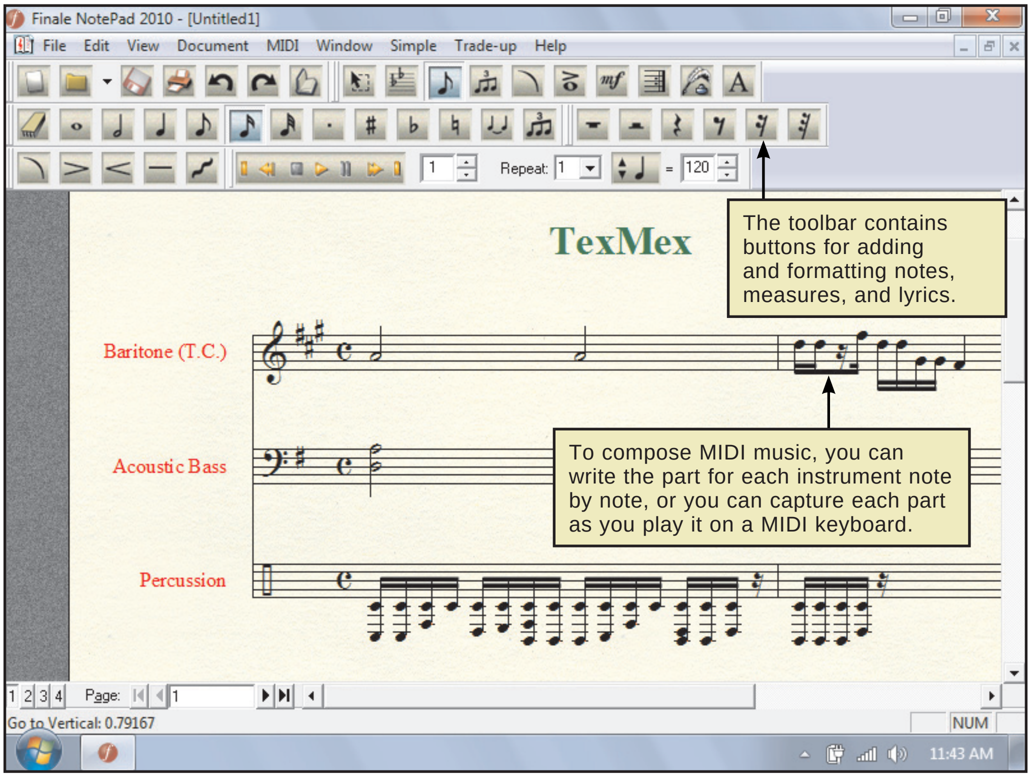
MIDI is suitable for instrumental music but not for vocals because of the complexity of synthesizing the human voice singing lyrics. MIDI's advantage lies in its ability to store a lengthy musical sequence in a very small file. One minute of MIDI music might require only 10 KB of disk space, compared to 500 KB for one minute of MP3 music.

MIDI is a key component of techno dance music with its signature beat, and MIDI is commonly used as backup instrumentation in a wide variety of music styles. Sound effects for movies and computer games are usually generated using MIDI.

You can use **sequencer software**, such as Cakewalk SONAR or Steinberg Cubase, to capture musical themes from a MIDI instrument, or you can enter the notes of your composition on a musical staff. You can then edit your composition by assigning the notes to different instruments, adding harmony, and inserting a percussion track. To find out what it's like to compose MIDI music, click the Try It! button.

Try It!

Figure 14-5



The toolbar contains buttons for adding and formatting notes, measures, and lyrics.

To compose MIDI music, you can write the part for each instrument note by note, or you can capture each part as you play it on a MIDI keyboard.

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FAQ How do computers recognize and generate speech?

Computers can accept and process spoken input using a process called **speech recognition**. Speech recognition software can be integrated with word processing software so that you can enter text simply by speaking into a microphone. Going beyond word processing, speech recognition can be used to activate Windows controls instead of using a mouse, and it can be used with a browser to "voice surf" the Web.

Speech synthesis is the process by which machines, such as computers, produce sound that resembles spoken words. Most speech synthesizers string together basic sound units called **phonemes**. For example, the phonemes "reh" and "gay" would produce the word "reggae."

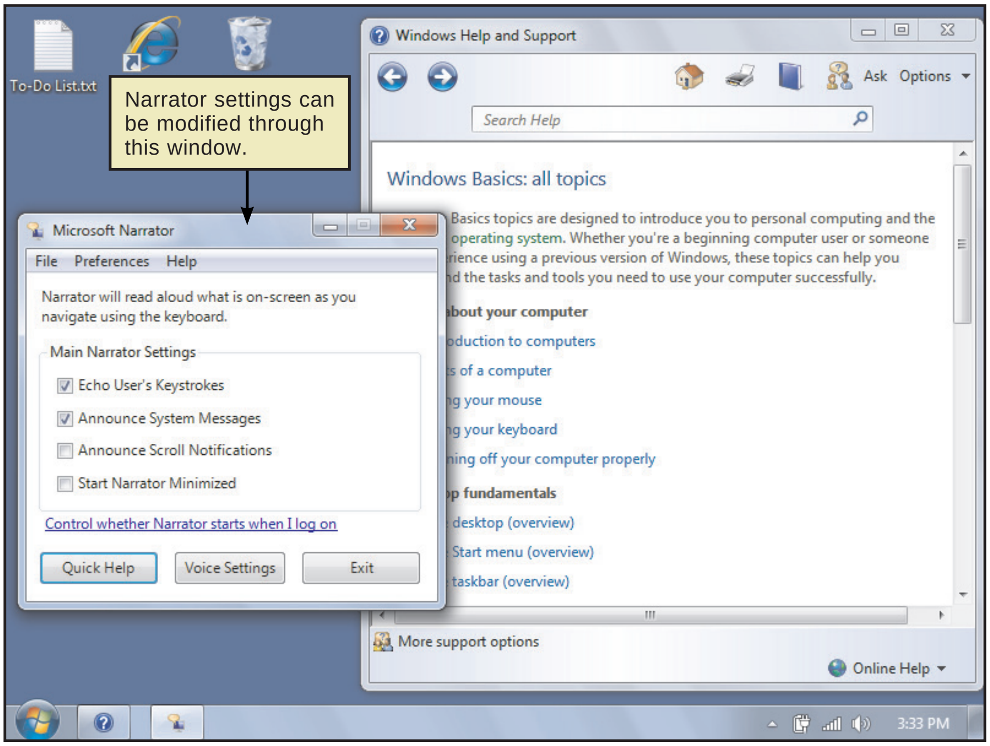
A speech synthesis system typically includes text-to-speech software and synthesizing hardware. **Text-to-speech software** examines the text stored in a file, displayed on the screen, or entered from the keyboard, and then breaks it down into a series of sounds that can be output. **Synthesizing hardware** consists of electronic circuitry that can generate speech or musical sounds. PC-based speech synthesis uses the computer's built-in audio circuitry as synthesizing hardware.

Unlike digitized speech, synthesized speech can theoretically produce any words or phrases—not just those that you have recorded. Synthesized speech is ideal for applications that require a computer to generate spoken responses to typed or voice input. It provides the underlying technology for voice-response systems, such as telephone directory assistance, and the voices you hear on NOAA Weather radio.

Text-to-speech systems also make it possible to phone your voice mail system and hear not only your voice mail messages, but also your computer e-mail. Perhaps most importantly, a speech synthesizer's ability to read a computer screen aloud is the key that unlocks access to PCs and to the Internet for individuals with visual disabilities. Windows 7 includes a text-to-speech module called Narrator. Click Try It! to see and hear how it works.

TryIt!

Figure 14-6


To-Do List.txt
Windows Help and Support
Ask
Options
Search Help
Windows Basics: all topics
bout your computer
oduction to computers
s of a computer
g your mouse
g your keyboard
ning off your computer properly
p fundamentals
desktop (overview)
Start menu (overview)
taskbar (overview)
More support options
Online Help
Microsoft Narrator
File
Preferences
Help
Quick Help
Voice Settings
Exit
3:33 PM

Narrator settings can be modified through this window.

Narrator will read aloud what is on-screen as you navigate using the keyboard.

Main Narrator Settings

☑ Echo User's Keystrokes
☑ Announce System Messages
☐ Announce Scroll Notifications
☐ Start Narrator Minimized

Control whether Narrator starts when I log on

Hardware

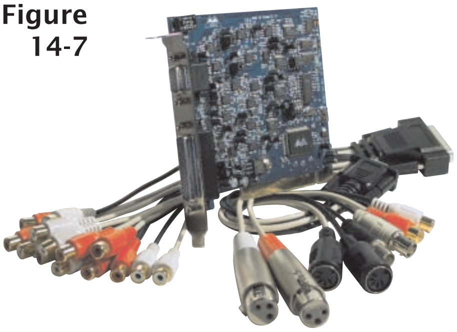
Audio devices

Your computer's **sound card** is responsible for transforming the bits stored in an audio file into music, sound effects, and narrations. Most sound cards can play digital audio files containing music and narrations, deliver 3D audio for computer game soundtracks, and produce surround sound when you play DVDs.

Initially, sound cards were small circuit boards that plugged into an expansion slot inside a computer's system unit. These cards contained audio processing circuitry plus a variety of input and output jacks for speakers, microphones, and headphones.

Today, you can still purchase expansion cards for desktop computers; but in many computers, audio circuitry is built into the system board and called **integrated audio**. Notebook computers usually have integrated audio because manufacturers save space by incorporating audio circuitry into the system board.

Figure 14-7

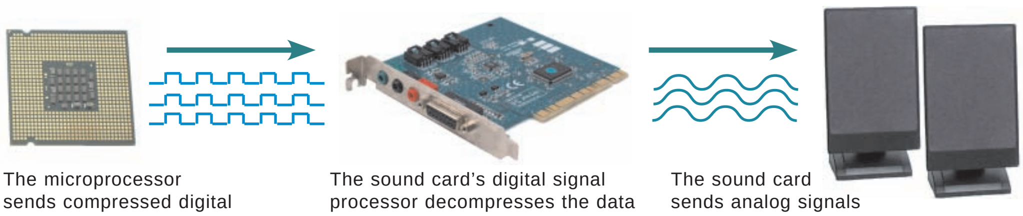


For playing games, using most business software, and browsing the Web, just about any basic audio circuitry produces adequate fidelity. However, plain vanilla audio might not meet the needs of computer owners who are really serious about sound or intend to record sound for professional use. Manufacturers of popular sound cards include Creative Labs, M-Audio, and Voyetra Turtle Beach. For a professional-quality sound card like the one in Figure 14-7, prices range up to US$500.

Audio circuitry is typically equipped to accept input from a microphone and send output to speakers or headphones. For processing digital audio files, your PC uses a special type of circuitry called a **digital signal processor**, which performs three important tasks. It transforms digital bits into analog waves when you play a digital audio file. It transforms analog waves into digital bits when you make a sound recording. It also handles compression and decompression, if necessary.

To play a digitally recorded sound, the bits from an audio file are transferred from disk to the microprocessor, which routes them to your computer's audio circuitry. The digital signal processor handles any necessary decompression, and then transforms the data into analog signals. These signals are routed to the speakers and voilà! You have sound.

Figure 14-8



The microprocessor sends compressed digital data to the sound card.

The sound card's digital signal processor decompresses the data and converts it to analog signals.

The sound card sends analog signals to the speakers.

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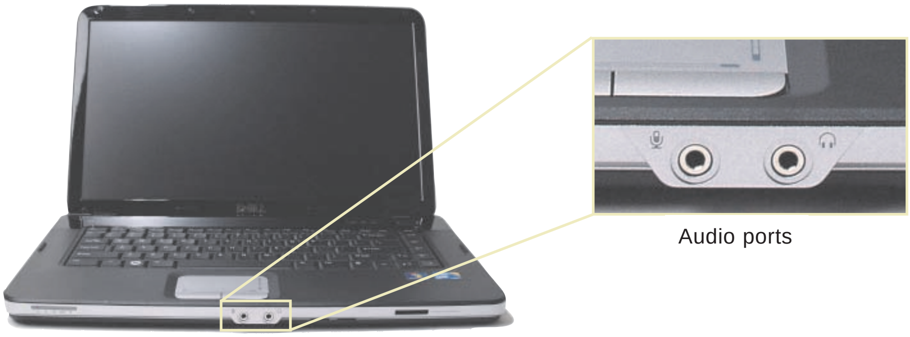
Hardware

(continued)

Your PC outputs sound to speakers or headphones. It gets input from a microphone. Notebook computers typically include a built-in microphone and speakers. Ports for external speakers and an auxiliary microphone can usually be found on the side or in the front of the system unit, as shown in Figure 14-9. If the ports on your sound card are not labeled, refer to your PC's documentation to find out which one to use.

Figure 14-9

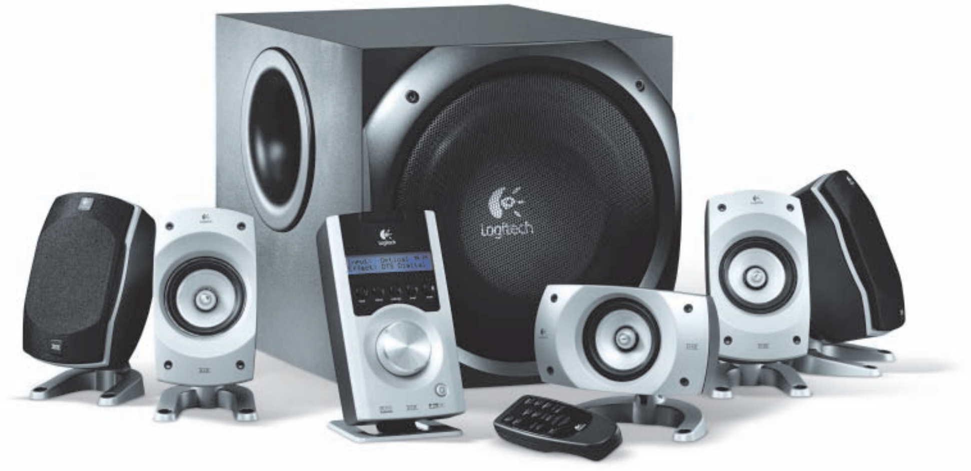


If you're not picky about sound quality, you'll find the bundled microphone suitable for radio-quality voice recording and sound effects destined for Web pages or presentations. For multimedia or professional audio projects, you'll want to shop for a better-quality "mic." You can connect most standard microphones to your computer through the microphone jack or USB port.

The speakers on your notebook computer are fine for listening to music; but when you're giving presentations or showing movies, you're likely to need external speakers to generate adequate volume. Speakers come in several configurations. A 2.0 speaker system includes two speakers for stereo effects. A 2.1 system adds a subwoofer for strong bass sound. A 5.1 system includes four speakers and a subwoofer. 2.0 and 2.1 systems are great for listening to music and for presentations; 5.1 systems are excellent for gaming and home theater systems.

Some speakers draw power from the computer, but they are limited in volume. Speakers with their own power plugs offer much more versatile audio output, especially in situations that require high volume. Computer speaker manufacturers include Audioengine, Harman Kardon, Altec Lansing, and Logitech.

Figure 14-10



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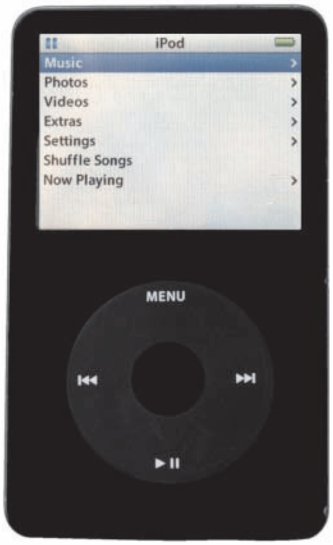
Hardware
(continued)

A **portable audio player** is a pocket-sized, battery-powered device that stores digital music in solid-state flash memory or on a microdrive (a tiny hard disk drive). Portable audio players are also called MP3 players. Popular examples include Apple's iPod and Microsoft's Zune. Even many mobile phones serve double duty as portable audio players.

You can transfer a series of digital music tracks, called a playlist, from your computer's hard disk to a portable audio player and have your personal collection of music wherever you go. You typically listen to music on your portable player using earbuds or headphones, but many players can also be connected to car and home stereo systems.

Figure 14-11



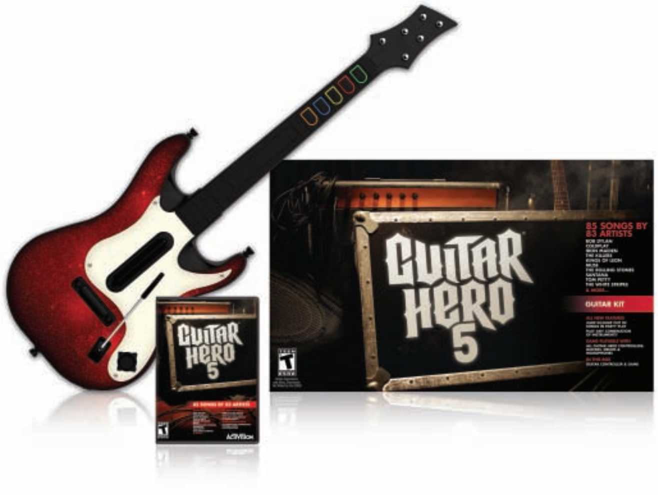
Digital music is available from online music stores, such as iTunes Store, Napster, Amazon MP3, Rhapsody, Wal-Mart MP3 Music Downloads, and the Zune Marketplace. Individual songs can be downloaded for less than US$1 each. The download price of an entire album is typically less than US$10. You can find free digital music, too. Famous performing artists and rock star wannabes post sample tracks from their CDs on Web sites, such as The Mod Archive. You can also rip music from your CD collection.

Most digital audio players support a variety of compressed audio formats, such as MP3, AAC, and WMA. Although MP3 remains a popular audio file format, newer standards offer better sound quality and compression. The iTunes Store uses the AAC format. Microsoft promotes its WMA format at the Zune Marketplace.

Rhythm and music activities such as Guitar Hero, Dance Dance Revolution Hottest Party, and Rock Band are becoming increasingly popular. Selected versions of these games are available for mobile devices and for PCs.

For guitar-based games on a PC you need a guitar controller, which looks like a guitar but its frets are actually buttons that you use to play notes with one hand as you use your other hand to "strum" a lever-like mechanism. The guitar controller connects to your PC's USB port; and after you've installed the software, you can jam along with legendary rock bands.

Figure 14-12



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Project

Explore digital sound

Imagine playing a fast-paced video game or watching an Alfred Hitchcock thriller on your PC with the speaker volume set to mute. Somehow, the suspense is watered down without appropriate music and sound effects. Sound, whether it's digitized or synthesized, plays a critical role in providing the ultimate multimedia experience. In this project, you will explore the array of sounds that Windows uses with program events, such as logging off Windows. You will also learn to use software, such as Windows Media Player, designed to handle audio files in various formats.

When you have completed the project, you should be able to:

- Customize the Windows sound scheme.
- Compare and contrast different audio formats.
- Rip tracks from a CD and burn a playlist onto a CD.

Requirements: This project requires Microsoft Windows 7, Paint, Windows Media Player, word processing software, two music CDs, and a blank CD (optional).

Deliverables:

1. A screenshot of your modified Windows sound scheme
2. A screenshot showing the Project 14 playlist
3. Optional: A CD containing the music in your playlist

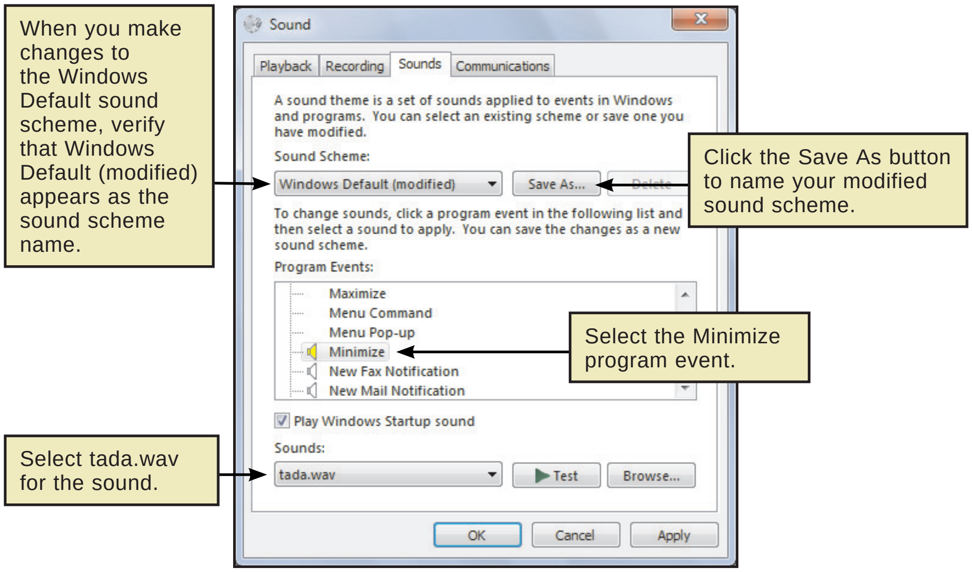
1. Windows uses a **sound scheme**, which is a set of sounds that accompanies events in Windows and applications. For example, the familiar sound that you hear when Windows starts up is part of the default Windows sound scheme. You can customize this default sound scheme to suit your taste.

2. Open the Control Panel and select *Hardware and Sound*. In the *Hardware and Sound* window, look for the Sound heading, and then select *Change system sounds*. The Sound window is displayed.

3. Under Sound Scheme, Windows Default should be specified. If this is not the case, click the down-arrow button and select Windows Default. Scroll through the program event list and select Exit Windows. The Windows Shutdown.wav file should be displayed under Sounds. Click the Test button to hear the sound associated with the Exit Windows event. Note that any event that has a sound associated with it is marked with a 🔈 symbol.

4. Suppose you want the Minimize event to be associated with the tada.wav file. Select Minimize in the event list. (None) should be specified under Sounds. Click the down-arrow button in the Sounds box and select tada.wav. Click the Test button to hear the "tada" sound. Take a screenshot and save it as **Project 14A [Your Name]**. Close the Paint window.

• Explore digital sound (continued)



A sound theme is a set of sounds applied to events in Windows and programs. You can select an existing scheme or save one you have modified.

Sound Scheme: Windows Default (modified)

To change sounds, click a program event in the following list and then select a sound to apply. You can save the changes as a new sound scheme.

Program Events:
Maximize
Menu Command
Menu Pop-up
Minimize
New Fax Notification
New Mail Notification

☑ Play Windows Startup sound

Sounds: tada.wav

When you make changes to the Windows Default sound scheme, verify that Windows Default (modified) appears as the sound scheme name.

Click the Save As button to name your modified sound scheme.

Select the Minimize program event.

Select tada.wav for the sound.

5. Click the Save As button near the top of the Sound dialog box and enter **[Your Name]** as the name of your sound scheme. Click the OK button.

6. To test your sound scheme, first open Paint, then minimize the Paint window. You should hear the “tada” sound.

7. If you are using a lab computer, return the Sound Scheme setting to Windows Default. Close all windows.

8. Suppose you have several favorite songs that are on different CDs and you want to combine them into one CD, perhaps to play in your car or at a party. You can accomplish this task with software that has a rip option. Use the Start menu’s Search box to open Windows Media Player.

9. Insert one of your music CDs in the CD/DVD drive. If the AutoPlay window appears, select *Play audio CD using Windows Media Player*. The first track of your CD should start playing.

10. Review the tracks using the navigation bar at the bottom of the window. Use the ■ Stop button, then click the ⏭ Next button to go to the next track. To listen to a track, click the ▶ Play button.

11. Before you rip tracks, you have to select an audio format. To do so, click the *Rip settings* button on the toolbar and select More Options. Click the down-arrow button for Format. Select each format, and look at the resulting slider-bar settings to see which formats require the least space.

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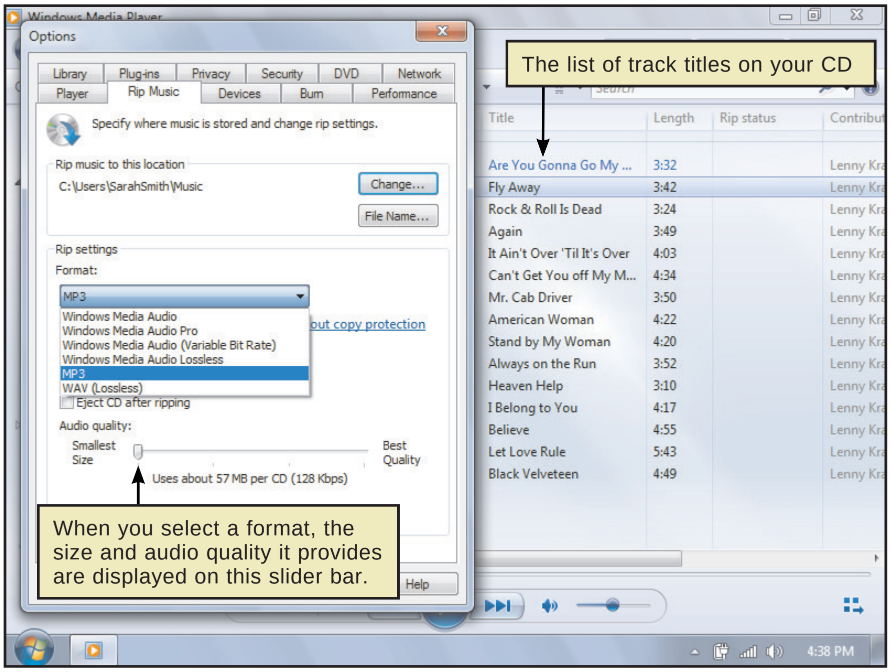
• Explore digital sound (continued)

12. Select the MP3 format as shown in the example below, and then click OK.


Windows Media Player
Options
Library
Plug-ins
Privacy
Security
DVD
Network
Player
Rip Music
Devices
Burn
Performance
Change...
File Name...
Windows Media Audio
Windows Media Audio Pro
Windows Media Audio (Variable Bit Rate)
Windows Media Audio Lossless
MP3
WAV (Lossless)
out copy protection
Eject CD after ripping
Help
4:38 PM

Specify where music is stored and change rip settings.

Rip music to this location: C:\Users\SarahSmith\Music

Rip settings

Format: MP3

Audio quality: Smallest Size — Best Quality

Uses about 57 MB per CD (128 Kbps)

Title	Length	Rip status	Contribut
Are You Gonna Go My ...	3:32		Lenny Kra
Fly Away	3:42		Lenny Kra
Rock & Roll Is Dead	3:24		Lenny Kra
Again	3:49		Lenny Kra
It Ain't Over 'Til It's Over	4:03		Lenny Kra
Can't Get You off My M...	4:34		Lenny Kra
Mr. Cab Driver	3:50		Lenny Kra
American Woman	4:22		Lenny Kra
Stand by My Woman	4:20		Lenny Kra
Always on the Run	3:52		Lenny Kra
Heaven Help	3:10		Lenny Kra
I Belong to You	4:17		Lenny Kra
Believe	4:55		Lenny Kra
Let Love Rule	5:43		Lenny Kra
Black Velveteen	4:49		Lenny Kra

The list of track titles on your CD

When you select a format, the size and audio quality it provides are displayed on this slider bar.

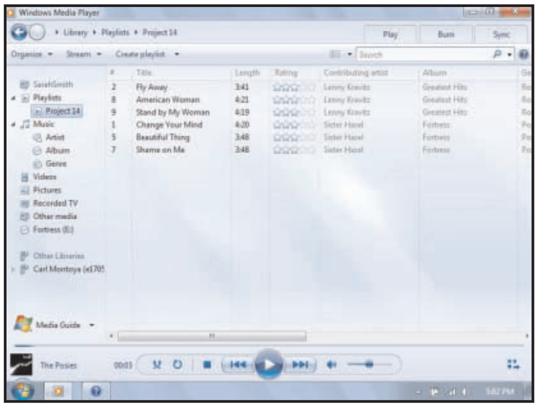
13. Uncheck all tracks, except for three that you'd like to rip to a new CD. Click the Rip CD button on the toolbar.

14. When you've ripped three tracks from your CD, remove the CD from the drive and insert your second CD. Rip three tracks from the second CD. Remove your second CD from the drive.

15. Combine the six tracks that you've ripped into a playlist by clicking Create Playlist on the toolbar. Enter **Project 14** as the name of the playlist. Scroll through your Music library and drag all six tracks to Project 14.

16. Select the playlist. Take a screenshot and save it as **Project 14B [Your Name]**.

17. Optional: You can burn your playlist onto a CD. Click the Burn tab, then drag the Project 14 playlist to the Burn list area. Insert an empty CD in the CD/DVD drive, and then click *Start burn* on the Burn tab.



18. Follow your instructor's directions to submit your project deliverables as e-mail attachments, on disk, or in print.

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Issue

Can I copy it?

Until 1971, no U.S. law protected recorded music. So-called “record pirates” legally copied and distributed hit songs. When an amendment to copyright law finally protected digital music, Congress did not intend to prevent individuals from recording broadcasts from tapes or records. It was perfectly legal to purchase, say, an Elvis Presley record and make a recording of it onto cassette tape for your own use.

Digital music put the home recording concept to the test. An online music sharing system called Napster allowed people to freely share and copy music in MP3 format. Millions of music lovers took advantage of Napster to build extensive collections of popular, copyrighted music. However, the Recording Industry Association of America determined it was losing millions of dollars in revenue; and as a result, music today is often distributed with digital rights management (DRM) that physically prevents copying, sharing, and other unapproved distribution.

Circumventing DRM is possible; however, the Digital Millennium Copyright Act makes it illegal to circumvent any technological measure that controls access to a work. Breaking into a copy-protected song is illegal. Even distributing instructions on how to break copy protection is illegal.

The current status of DRM seems to conflict with consumer expectations for manipulating and copying music, video, and other digital content. If you purchase a CD, for example, you should expect to be able to copy your favorite songs to your computer, your mobile phone, or your portable audio player. However, if the CD is protected by DRM, copies of the music might be deliberately distorted with buzzes and pops. Music files purchased from an online music store might be encoded with restrictions on the number of copies you can make.

DRM technologies are still evolving, as are copyright laws. The Digital Millennium Copyright Act undergoes a formal review every three years, but so far music label lobbyists have been successful in preventing any relaxation of the rules. Relief for consumers has come primarily from Apple CEO Steve Jobs, who removed DRM from iTunes music in 2009.

What do you think?

1. When you purchase a music CD, do you believe that you should have the right to convert it into any format (such as WMA or MP3) for your own use? ○ Yes ○ No ○ Not sure
2. Do you think the Digital Millennium Copyright Act should be revised to allow people to circumvent DRM for music that they have purchased legitimately? ○ Yes ○ No ○ Not sure
3. Have you ever been prevented from copying music by some type of DRM technology? ○ Yes ○ No ○ Not sure

Save It!

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QuickCheck A

1. For the clearest, most realistic digital recording, you should use a sampling rate of ________ kHz.
2. Digital audio is analogous to a tape recording, whereas ________ music is more like a player piano roll.
3. ________ -to-speech is the underlying technology for NOAA Weather radio and computer screen readers.
4. The process of importing tracks from an audio CD to your computer's hard disk is called ________ .
5. True or false? MP3 is a compressed digital sound format. ________

Check It!

QuickCheck B

Click the Sound buttons to listen to each sound, then match it with the correct description below:

1. Synthesized voice ☐
2. Digitized voice at 11 kHz sampling rate ☐
3. Digitized voice at 44 kHz sampling rate ☐
4. Digital audio ☐
5. MIDI music ☐

Sound A

Sound B

Sound C

Sound D

Sound E

To use this QuickCheck, your PC must be equipped with a sound card and speakers (or headphones).

Check It!

Get It? While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 14.

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CHAPTER 15

Working with Graphics

What's Inside?

You live in a world filled with strong visual images—kaleidoscopic MTV videos, photo-rich magazines, and lavishly-illustrated Web sites. It is more important than ever to learn how to incorporate graphical images in the documents, presentations, and Web sites that you create. Chapter 15 will get you started.

- **FAQs:**
  - What kinds of graphics can I work with on my PC? 213
  - When should I use bitmap graphics? 214
  - How do I choose a bitmap format? 215
  - When should I use vector graphics? 216
  - How do I create 3D graphics? 217
- **Hardware:** Digitizing devices 218
- **Project:** Explore digital photos 221
- **Issue:** Is that really a UFO? 224
- **QuickChecks** 225

What's on the CD?

Chapter 15 videos and screen tours show you how to become a PC artist.

- Browse through a gallery of computer graphics 213
- Tour the graphics software that's free with Windows 214
- Check out vector graphics software 216
- Build a 3D object 217
- Find out how to scan a photograph or newspaper clipping 219
- Learn how to use a digital camera 220

FAQ What kinds of graphics can I work with on my PC?

The pictures that you can create, modify, store, download, and transmit using your PC are referred to as **graphics** or **images**. Graphics add visual interest to documents, worksheets, presentations, and Web pages.

If you're artistic, you'll probably enjoy creating artwork and illustrations using your PC. However, you don't have to be an artist to spice up your projects with graphics. You can obtain ready-made images from a variety of sources. Clip art and stock photo collections distributed on CDs or the Web contain thousands of professionally-designed images. You can use a scanning device to convert pictures from books and magazines into image files that you can manipulate on your PC. When using images that someone else has created, however, always make sure to cite the source and adhere to any applicable copyright laws or licensing restrictions.

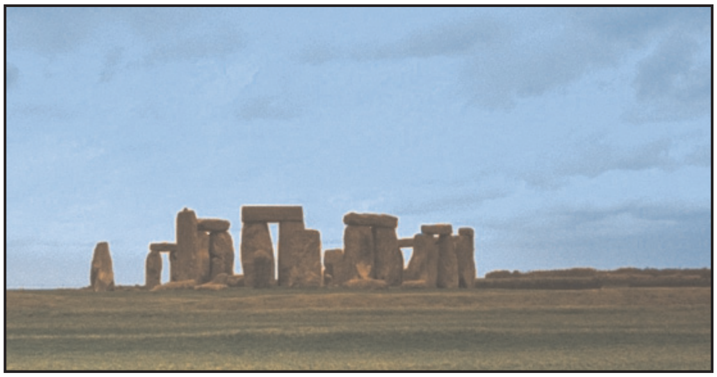
Photos from your own collection can be converted into computer-compatible formats. You can also use a digital camera to take photos that don't require any conversion before they are used on your PC.

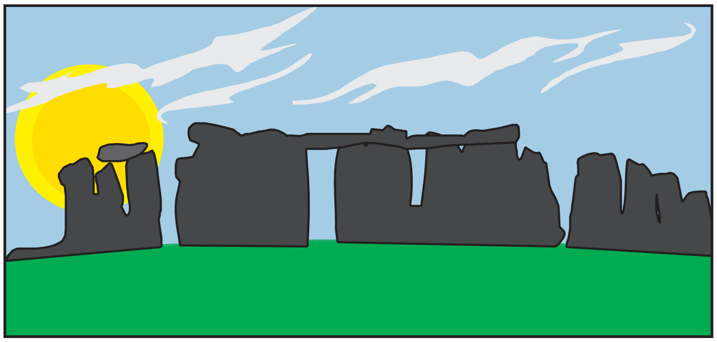
You'll typically work with two types of graphics: bitmap graphics and vector graphics. Understanding the difference between the two allows you to select the type of graphic that is best suited for a project. The rest of the FAQs in this chapter provide the basic information that you need to work with bitmap and vector graphics.

A bitmap graphics image (upper left) has a distinctly different appearance than a vector graphics image (lower right). Click the Try It! button to view a gallery of bitmap and vector graphics.

TryIt!

Figure 15-1





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FAQ When should I use bitmap graphics?

Bitmap graphics, sometimes called raster graphics, represent an image as a grid of colored dots. Each dot in the grid is referred to as a pixel. On your computer screen, each dot is represented by a tiny liquid crystal or LED light. On a printout, a pixel is represented by a drop of ink.

Because bitmap graphics produce photograph-like images, you use them for photos, images you add to Web pages, and pictures that you convert from paper to computer format. Bitmap graphics can be stored in a variety of file formats—including BMP, TIFF, GIF, PNG, and JPEG—which are easily converted from one format to another. To create and manipulate bitmap graphics, you typically use **paint software**, such as Adobe Photoshop, Corel Painter, open source GIMP, or Microsoft Paint.

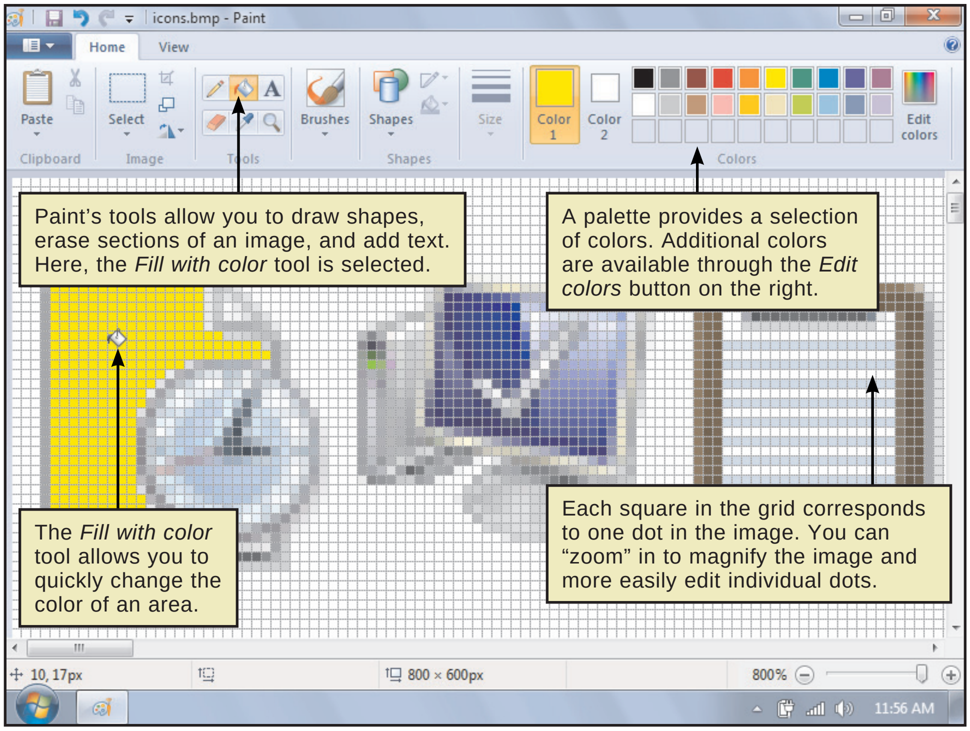
The quality of an image depends on its resolution and color depth. **Image resolution** is expressed as the width and height of the grid that holds the dots. For example, an image with 1024 X 768 resolution is formed from a grid 1,024 dots wide and 768 dots high. High-resolution images exhibit details more clearly than low-resolution images.

Each dot in an image is assigned a code number for its color. The number of bits required to store the color number is referred to as **color depth** and determines the number of colors that the image contains. A 1-bit color depth produces an image containing only two colors: black and white. An 8-bit color depth produces 256 colors. A 24-bit color depth produces 16.7 million colors, sometimes referred to as **true color**. The more colors an image contains, the more realistic it appears.

Windows includes basic bitmap graphics software called Paint that you can access from the Accessories folder. Click the Try It! button to find out how to use Paint to create and modify bitmap graphics.

Try It!

Figure 15-2



Paint's tools allow you to draw shapes, erase sections of an image, and add text. Here, the *Fill with color* tool is selected.

A palette provides a selection of colors. Additional colors are available through the *Edit colors* button on the right.

The *Fill with color* tool allows you to quickly change the color of an area.

Each square in the grid corresponds to one dot in the image. You can "zoom" in to magnify the image and more easily edit individual dots.

FAQ How do I choose a bitmap format?

Graphics are most commonly stored in JPEG, TIF, BMP, PNG, GIF, and RAW files. The file type you use to store an image is often referred to as its format. The format you choose for a graphic depends on how you plan to use it. For printed publications, you should use a format that retains high resolution and 24-bit color depth. Images that you plan to post on the Web should be stored in a format supported by browsers. Web graphics and e-mail attachments should be stored in compact formats so they can be transmitted quickly over the Internet. You can decrease file size by shrinking the physical dimensions of an image, saving it in a compressed file format, or reducing its color depth.

Shrinking the physical dimensions of an image allows you to reduce its file size. A 2" x 2" image can be stored in a file that is one-fourth the size of the same image at 4" x 4". Most graphics software provides a tool to resize or “scale” an image.

You can also use compression techniques to decrease image file size. Some file formats provide built-in compression that reduces file size simply by using a more effective storage technique. For example, when stored in BMP or TIF format, a given image might require about 950 KB of storage space. Using JPEG format with built-in compression, the file size can be reduced to 48 KB.

Lossless compression methods shrink the size of a graphic without discarding any data that reduces image quality. **Lossy compression** discards data and can reduce image quality. Be careful when using JPEG format, for example, because its lossy compression discards data every time you edit the image. This **generation loss** can lead to images becoming successively blurrier with each edit.

A true-color graphic requires 24 bits for each dot of color in an image, whereas a 256-color graphic requires only 8 bits. Therefore, by reducing the color depth from true color to 256-color, the image file shrinks to a third of its original size. When combined with compression techniques, color reduction can significantly shrink file size. Unfortunately, reducing color depth can reduce image quality. You'll have to view the converted image to evaluate if it is acceptable.

Figure 15-3

File Type	Characteristics	Uses
BMP	Windows native bitmap graphics file format; not compressed; large files	Graphical elements, such as buttons and other controls used in computer programs
JPG (JPEG)	User-selectable compression; generation loss can reduce image quality; supported by most browsers	Photographic or scanned images for desktop publishing, Web page images, e-mail attachments
PNG	An open-source graphical format that compresses images without losing data; supported by most browsers	An alternative to GIF for Web graphics; better than JPEG for storing images containing text
TIF	Versatile format that can be compressed; supported by many digital cameras	High-resolution images of photos or line art for desktop publishing and printouts from photo printers
RAW	Unprocessed data captured directly from a digital camera's sensor array; very large files	RAW images have to be converted into other formats before they can be edited or printed
GIF	Supported by most Web browsers; limited to 256 colors; lossy compression	Most commonly used for Web page graphics, but not for digital photography

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FAQ When should I use vector graphics?

A **vector graphic** consists of a set of points, lines, arcs, and other geometrical shapes. Each shape is defined as a series of line segments called vectors, and attributes such as line width and fill color. A list of these vectors and attributes becomes essentially a set of instructions for redrawing the image. Vector graphics are ideal for diagrams, line drawings, typesetting, graphs, corporate logos, road signs, sequential art, and organizational charts. They are also associated with **computer-aided design** (CAD), the process of creating technical drawings and blueprints on a PC.

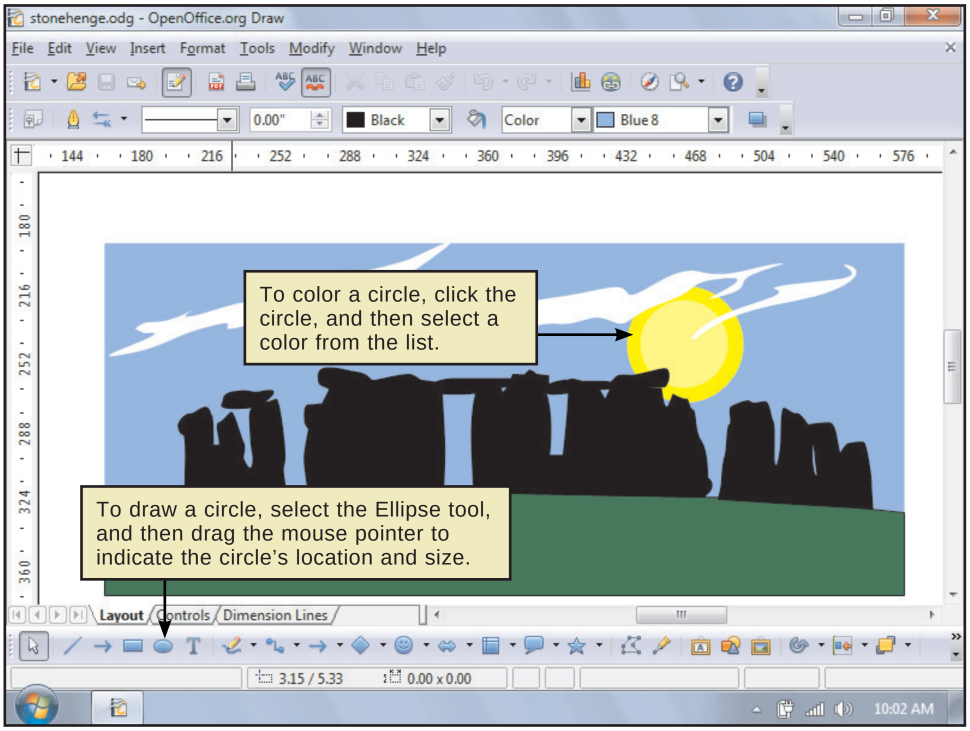
Vector graphics do not look like photographic images. Two-dimensional vector graphics typically have large flat areas of color and more closely resemble cartoons than photos. Vector graphics have three advantages over bitmaps. First, vector files tend to be small because the vectors and attributes describing a shape can be stored very efficiently. Second, vector graphics can shrink or expand with no loss of quality. Third, the shapes in a vector graphic exist as individual objects that you can modify independently without affecting other parts of the image.

Drawing software provides tools to create and manipulate vector graphics. Popular packages include Adobe Illustrator, OpenOffice Draw, and CorelDRAW. **CAD software** includes Autodesk AutoCAD, CADopia IntelliCAD, and IMSI TurboCAD. You'll find many Web-based vector graphics files stored in SVG (Scalable Vector Graphics) format. Graphic designers make extensive use of Adobe Illustrator (AI) and EPS (Encapsulated PostScript) formats. Windows clip art is usually stored as WMFs (Windows Metafiles). Popular CAD formats include DXF and DS4.

Vector graphics are designed to work with layers of shapes. For example, each circle for the sun in Figure 15-4 is defined by its shape, position, color, and layer. Click Try It! to discover how to work with vector graphics.

Try It!

Figure 15-4



To color a circle, click the circle, and then select a color from the list.

To draw a circle, select the Ellipse tool, and then drag the mouse pointer to indicate the circle's location and size.

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FAQ How do I create 3D graphics?

You can create **3D graphics** containing objects that appear to be three-dimensional. Objects in a 3D graphic not only look three-dimensional, but also include the data necessary to display, rotate, and view them from any angle, viewpoint, or perspective. Composed of vectors, 3D objects are typically created using the same drawing and CAD software as two-dimensional vector graphics.

To create a 3D object, you first produce a line drawing called a **wireframe** by outlining every surface on the front, back, and inside of the object. Once the wireframe is complete, you can define the texture, transparency, and color for each of its surfaces. The process of applying surfaces to a wireframe and producing a 2D image is called **rendering**. This process is similar to draping a nylon tent covering over its frame and then snapping a photo of it.

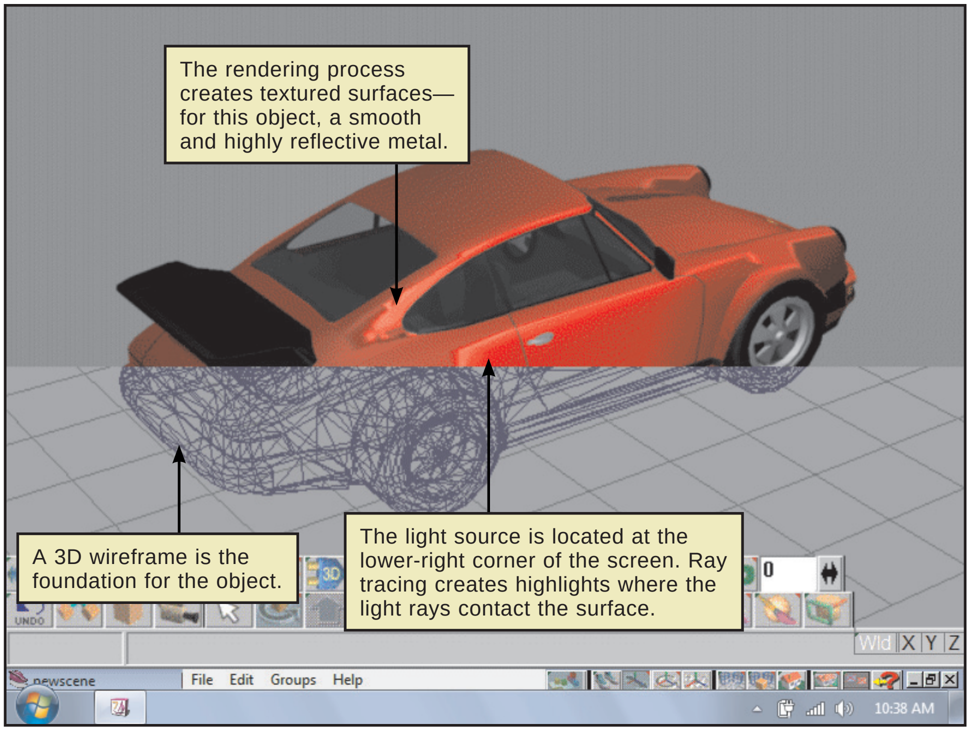
As part of the rendering process, you can specify a light source and your PC automatically determines where to put highlights and shadows. This part of the rendering process is called **ray tracing** because your PC essentially traces the rays of light from the light source to the object.

Rendering is a complex activity that requires your PC to carry out extensive calculations. Today's high-speed processors render action figures and scenery for computer games in real time as you play the game. For more complex images, such as movie special effects, the rendering process can take minutes or hours, depending on the complexity of the objects, computer processing speed, and the resolution of the completed image.

Rendered 3D graphics have a new-car-brochure look that's sometimes referred to as "super-realistic." Objects within the image are perfectly shaped and highly defined. Surfaces appear unflawed and brilliantly highlighted. Click the Try It! button to learn how to construct a wireframe, render a 3D object, and apply ray tracing.

Try It!

Figure 15-5



The rendering process creates textured surfaces—for this object, a smooth and highly reflective metal.

A 3D wireframe is the foundation for the object.

The light source is located at the lower-right corner of the screen. Ray tracing creates highlights where the light rays contact the surface.

Hardware

Digitizing devices

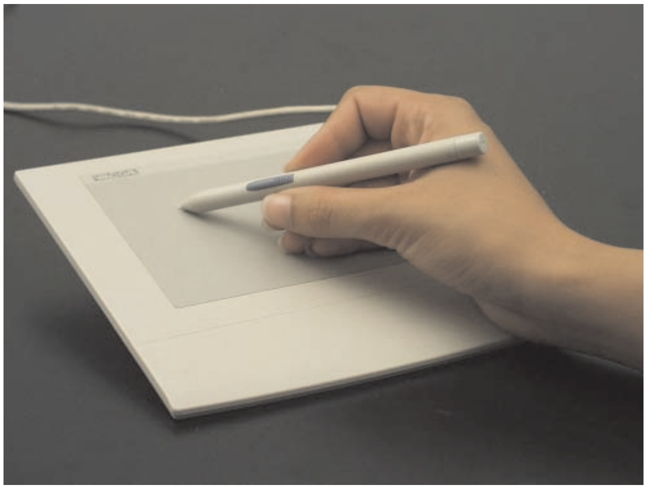
Before you can work with images on your PC, they must exist in digital format. **Digitizing** is the process of converting an image into a series of 1s and 0s that your PC can store, transmit, and display. **Digitizing devices**, such as graphics tablets, scanners, and digital cameras, allow you to convert real objects—such as sketches and photos—into digital format. These fun-to-use devices can help you produce impressive results, even if you're not a professional artist.

A **graphics tablet** works like an electronic canvas. You use a pen-shaped stylus to "paint," and the movement of the stylus is picked up by the electronics in the pad, converted into a bitmap format, and displayed on the screen. The pad is sensitive not only to where you move, but also to the degree of pressure that you apply. You can press hard to draw a thick, dark line. Lighter pressure produces a thinner, lighter line.

Some graphics software does not fully support the use of a graphics tablet. For example, although you can use the stylus to select tools and draw shapes in Microsoft Paint, this software does not recognize different pressures. If you are serious about using a graphics tablet, choose graphics software that specifically supports its features and read the box to make sure it works with a graphics tablet or pressure-sensitive pen. Adobe Photoshop and Corel Painter are good companion software packages for graphics tablets.

A graphics tablet typically connects to the USB port of your PC and requires the installation of special device driver software to establish communications with Windows. The price of a basic graphics tablet and stylus starts at US$70. Prices go up from there and can exceed US$500, depending on the size of the pad and the pen accessories that you select. Currently, best sellers include Wacom Intuos and Bamboo tablets. A graphics tablet is a fun addition to your PC for doodling, and an essential tool for serious artists.

Figure 15-6



Hardware

(continued)

A **scanner** is a digitizing device that “reads” text, images, and bar codes. It is typically used to digitize flat objects, such as photos, newspaper clippings, and documents. These digitized images can be stored on your PC, modified, e-mailed to friends, or posted on the Web.

Among the many types of scanners, **flatbed scanners** that resemble small photocopiers are the most popular with PC owners. Scanners are also included in multifunction printers that print, scan, and copy. Scanners are surprisingly inexpensive. You can purchase a serviceable basic unit for about US$49. Most scanners are easy to connect—just plug them into a USB port.

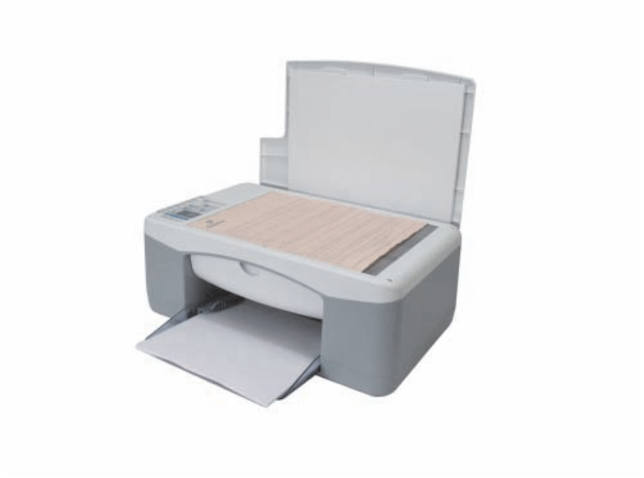
Scanners are typically bundled with several types of software. The scanner’s device driver software, which establishes communication between the scanner and Windows, must be installed when you connect the scanner. **Scanning software** allows you to preview a scan, select a resolution, and initiate the scan from your PC. **OCR software** (optical character recognition) allows you to convert a scanned document, such as a newspaper clipping, into a text file that you can edit with a word processor. The accuracy of today’s OCR software is fairly high, but not perfect. Therefore, it is a good idea to use a spelling checker and proofread documents produced by OCR software.

To use a scanner, place the item you want to digitize face down on the scanner glass. Next, fire up your scanning software and select the resolution for the scan. Remember that higher resolutions produce sharper images, but can require a tremendous amount of storage space on your PC. For Web graphics, a scan at 300 dpi is usually sufficient. For images that you plan to print, you should use a higher scan resolution, typically 600 or 1200 dpi. Once the actual scan begins, the digitizing process usually takes a minute or so to complete. If you’re satisfied with the results displayed on your PC’s screen, you can save the image as a file, which you can then manipulate with any paint software.

When preparing to scan an image, use your software’s preview feature to ensure that your photo or document is squarely aligned on the scanner. Specify the part of the image that you want to scan, then select a resolution that produces a sharp image, but with a manageable file size. Learn more about scanning by clicking the Play It! button in Figure 15-7.

PlayIt!

Figure 15-7



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Hardware
(continued)

A **digital camera** takes photos and stores them as bitmap images, instead of capturing them on film. When paired with a color ink jet printer and your PC, a digital camera puts you in control of the entire picture-taking process—from snapping the picture to printing the final image or posting it on the Web. A digital camera resembles its film-based counterparts, and taking pictures is just as easy. Basically, you point and shoot.

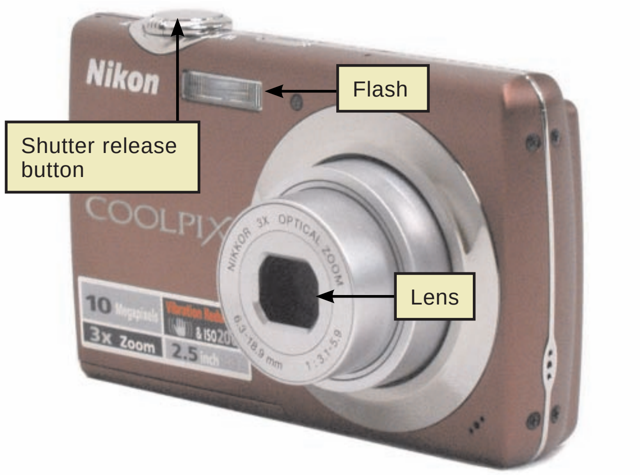
After finishing your photo shoot, you can transfer the photos to your PC by plugging your camera into the USB port on your computer. If your computer includes slots that accept the type of memory card used in your camera, you can remove the card from your camera and insert it into the memory slot of your PC. The process of transferring images from your camera to the hard disk drive of your PC can take several minutes, depending on the number of photos you've taken and the size of the files. As the images are transferred, they're stored as files on your PC. You can open these image files using most paint or photo editing software.

Manufacturers of digital cameras include familiar names such as Canon, Nikon, Olympus, Kodak, Konica, and Minolta. Prices depend on the camera's resolution, which is typically measured in megapixels. A **megapixel** is a million pixels, calculated by multiplying the number of horizontal pixels by the number of vertical pixels. The quality of digital photos has increased dramatically over the past few years, while prices of digital cameras have plummeted. With the increased capabilities of digital cameras and the excellent output from color ink jet printers, even professional photographers are switching from film to digital photography.

Basic digital cameras, priced under US$200, feature 5-megapixel resolutions. These cameras are suitable for capturing good quality snapshots for use on the Web and in personal photo albums. Mid-range digital cameras, priced at US$200 to US$1,000, offer higher resolutions and better quality lenses for producing consumer quality photos. You can even purchase a pocket-sized digital camera with a built-in projector. Click the Play It! button to learn how to produce your own digital photos. This video takes you through the entire process. You'll find out how to take the photo, transfer it from your camera to your PC, save it, and print it.

Play It!

Figure 15-8



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Project

Explore digital photos

Photo editing software is a specialized type of paint software that provides a set of tools for manipulating and retouching digital photographs. Even with the simplest photo editing software, you can rescue pictures that are washed out, too dark, too bright, or out of focus. You can even eliminate those poltergeist-like red eyes caused by your camera's flash mechanism.

You can use photo editing software to have some fun with your photographs. For example, you can turn current photos into old-fashioned tintypes. With more sophisticated photo editing software, you can go for a "Pleasantville" look by hand-coloring parts of black-and-white photos. You can also delete unwanted objects from a photo or create an entirely new reality by superimposing objects on backgrounds—like pasting your dog on a lunar landscape.

When you have completed the project, you should be able to:

- Adjust the lighting and sharpen a photo image.
- Adjust the colors in a photo and create a black-and-white version of a color photo.
- Crop a photo.
- Eliminate the "red eye" effect in a photo.

Requirements: This project requires Microsoft Windows 7, Windows Live Photo Gallery, and browser software, such as Internet Explorer, Netscape, Safari, Chrome, or Firefox.

The deliverable for Project 15 is an e-mail message that includes the following:

1 A zipped folder named Project 15 containing the following photos:

a. Dock (exposure and color improved)

b. Dock_one (black-and-white crop)

c. Medals (red eye removed)

2 A comparison of the file sizes of the three edited photos and the original versions

1. Click the Copy It! button to copy the Prj15.zip file to your My Pictures folder.

2. Use the Start menu's Search box to open Prj15.zip. Click the *Extract all files* button on the toolbar. By default, the extracted files will be placed in a folder called Prj15. Click the Extract button to accept the default location. The extracted files Dock and Medals are displayed. Write down the file sizes of the original files before editing them.

3. Some of the software that you need for this and the next project is available from Windows Live Essentials. To find out if this software is installed on your computer, click the Start button and type **Windows Live**. If Windows Live Photo Gallery appears in the Programs list, skip Step 4 and proceed to Step 5.

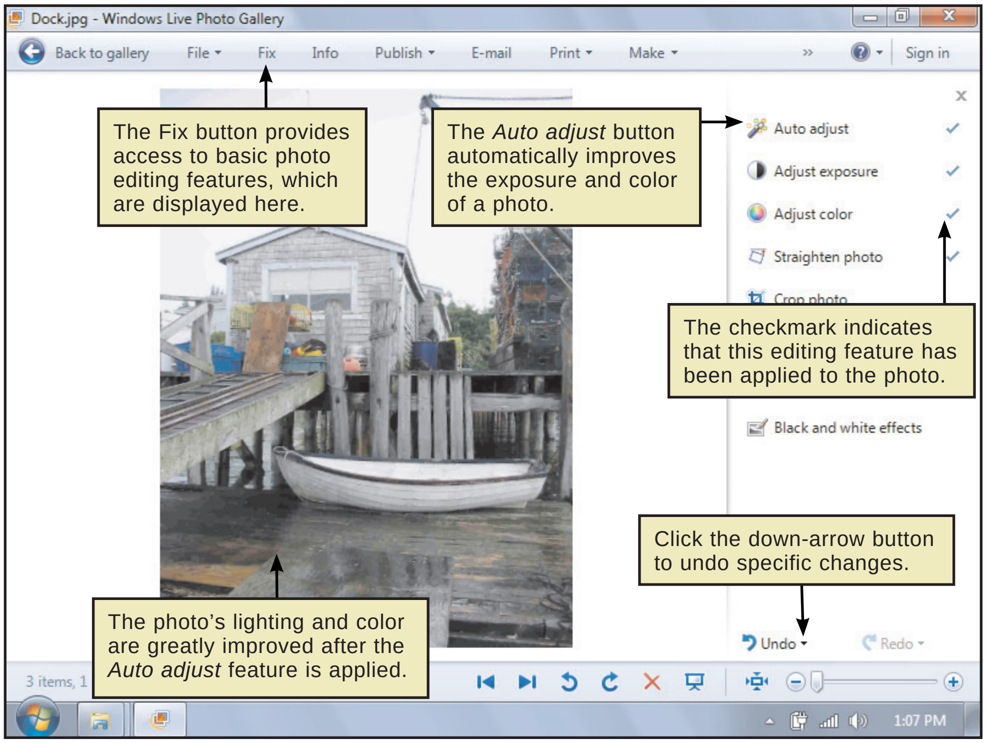
4. Perform this step only if you need to download and install free Windows Live Essentials software. Open your browser and connect to http://download.live.com. On the right side of the window choose your language, then click the Download button. Click the Run button. If necessary, enter an administrator password and click Yes. When the Service agreement window opens, read the agreement, then click the Accept button. Make sure there are checkmarks for Photo Gallery and Movie Maker, then click the Install button. Remove checkmarks for setting the search provider and home page on your computer, then click the Continue button. Click the Close button to complete the installation.

• Explore digital photos (continued)

5. From the Start menu open Windows Live Photo Gallery. Navigate to the Prj15 folder. Double-click the Dock file to open it. The right side of the window typically displays the properties—such as file size and file type—of a photo. You can also click the Info button on the toolbar to display the properties.

6. You will need two copies of the dock photo. It is easy with Photo Gallery to create an additional copy. Click the File button on the toolbar and select *Make a Copy*. Enter **Dock_one [Your Name]** as the file name and click the Save button.

7. Suppose you want to improve your photo, particularly the lighting. Click the Fix button on the toolbar. A list of basic photo editing features is displayed on the right. At the top of the list, the *Auto adjust* button can be used to improve brightness and contrast, adjust the color balance, and straighten a photo. Click the *Auto adjust* button. Checkmarks to the right of the *Auto adjust*, *Adjust exposure*, *Straighten photo*, and *Adjust color* buttons indicate that the four features have been applied to your photo, as in the example below.



The Fix button provides access to basic photo editing features, which are displayed here.

The *Auto adjust* button automatically improves the exposure and color of a photo.

The checkmark indicates that this editing feature has been applied to the photo.

Click the down-arrow button to undo specific changes.

The photo's lighting and color are greatly improved after the *Auto adjust* feature is applied.

8. You can further adjust the exposure of your photo by clicking the *Adjust exposure* button to expand its feature list. Experiment with brightness and contrast settings by moving the sliders to the right or left. When you're satisfied with the settings, click the *Adjust exposure* button to hide the brightness and contrast controls. Note that you can click Undo's down-arrow button—located at the bottom of the window—if you change your mind about any changes you've made.

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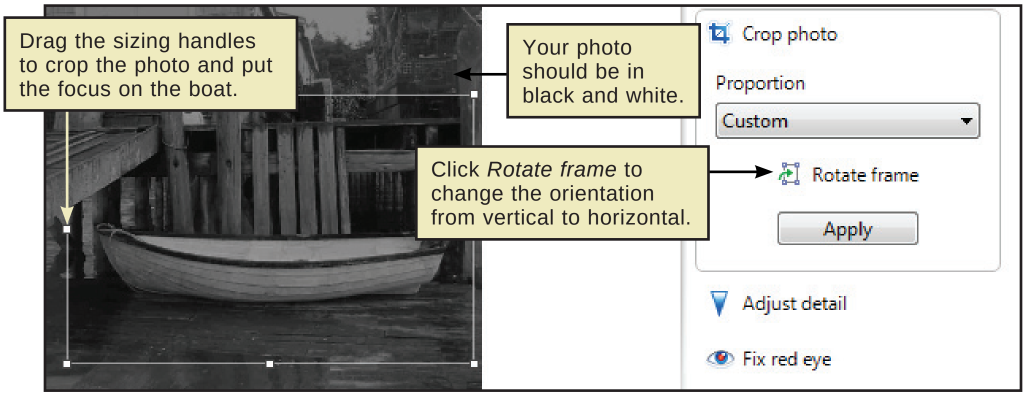
• Explore digital photos (continued)

9. Photo Gallery automatically saves your changes as they are made, so you don't have to remember to click Save before you work on another photo. Now, let's make some changes to Dock_one. Click the ⏭ right arrow on the navigation bar at the bottom of the window until Dock_one is displayed on your screen.

10. Click the *Black and white effects* button. Select the effect that you like, then close the *Black and white effects* list.

11. Suppose you want a photo of only the boat. Click the *Crop photo* button, then click *Rotate frame*. Move the sizing handles to outline the area shown in the example below. Click the Apply button to close the *Crop photo* list.



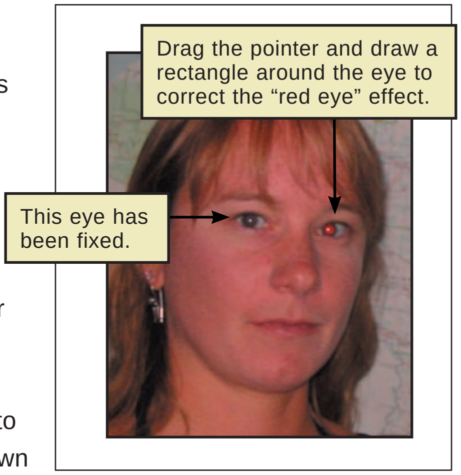
Drag the sizing handles to crop the photo and put the focus on the boat.

Your photo should be in black and white.

Click *Rotate frame* to change the orientation from vertical to horizontal.

12. Now switch to Medals, the last photo in your folder. Click the *Auto adjust* button.

13. You can correct this photo's "red eye" effect, which is caused by the camera's flash. Click the *Fix red eye* button and follow the directions displayed. Compare your work to the example here.



Drag the pointer and draw a rectangle around the eye to correct the "red eye" effect.

This eye has been fixed.

14. Click the *Back to Gallery* button on the toolbar, then click the Close button to close Photo Gallery. The contents of the Prj15 folder should be on your screen.

15. Write down the file sizes of the edited photos to compare them with the file sizes you wrote down in Step 2.

16. To create a zipped folder for all the edited photos, select all three files, then right-click them. Select *Send to*, then click *Compressed (zipped) folder*.

17. Enter **Project 15 [Your Name]** as the name of the zipped folder. Send an e-mail message to your instructor with Project 15 in the subject line. Include the file sizes you recorded in Steps 2 and 15. Attach the compressed folder containing your photos.

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Issue

Is that really a UFO?

The highly publicized O. J. Simpson murder trial was followed by an equally high-profile wrongful-death suit. Introduced into evidence were a bloody footprint from the crime scene made by a size 12 designer shoe, and a photo of Mr. Simpson wearing such a shoe. Conclusive evidence of guilt? Not according to the defense attorney, who raised doubts about the photo's authenticity.

Faked photos are not a product of the digital age. Long before the first digital cameras, tabloid newspapers in supermarket checkout lanes carried blurry photos allegedly depicting UFOs, the Loch Ness monster, and so on. In those days, most people had confidence that experts could detect photos doctored by amateurs or even by professionals. The deception could be discovered by a missing shadow, an obvious trace of cut and paste, or inconsistencies in coloration.

In today's digital world, however, it is possible to alter the individual dots in a photo. When done carefully, these alterations can be difficult or even impossible to detect. Sure, it can be innocent fun, like when you digitally paste your roommate's head onto a picture of Bart Simpson. Unfortunately, it also introduces a note of uncertainty into the evidence we rely on to form opinions of everyday events and life-and-death situations, such as a murder trial or war crimes investigation.

Even videotapes, once virtually impossible to alter, can be digitized and doctored today. In the film *Forrest Gump*, digital editing techniques were used to paste the star, Tom Hanks, into authentic newsreels of past events—Forrest Gump meets with President Kennedy and history appears to be changed.

In *Simone*, Al Pacino portrays a desperate director who uses a computer-generated actress as his leading lady. Adoring fans think Simone ("Simulation One") is a real star. Pacino's character quips, "Our ability to manufacture fraud now exceeds our ability to detect it." Living in a digital world, it is important to consider how you can responsibly evaluate the images that you see in newspapers, on television, and at the movies.

What do you think?

1. In your opinion, should photos and videotapes be allowed as evidence in civil and criminal trials? ○ Yes ○ No ○ Not sure

2. Do you think that it would be possible for someone to use doctored photos and videotapes to convince people that a fake event actually took place? ○ Yes ○ No ○ Not sure

3. Do you have a set of criteria for judging the authenticity of newspaper and TV images? ○ Yes ○ No ○ Not sure

Save It!

QuickCheck A

1. An image with 8-bit ☐ depth can contain up to 256 colors.

2. True or false? To prepare an image for Web use, you should store it in true color BMP format. ☐

3. ☐ graphics are stored as a set of instructions for recreating the shapes and attributes of an image.

4. Architects often use ☐ software to create 3D graphics.

5. The part of the rendering process that creates highlights and shadows for a 3D object is called ☐ . (Hint: The answer contains two words.)

CheckIt!

QuickCheck B

There is only one way to correctly match the five objects pictured on the right to the five descriptions below. Indicate the correct letter for each description.

1. A wireframe ☐

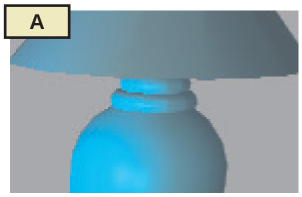
2. A vector graphic ☐

3. A bitmap graphic ☐

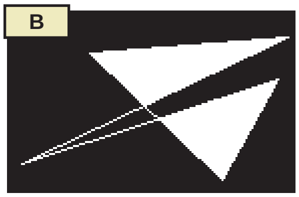
4. A rendered image ☐

5. An image produced by a 1-bit color depth ☐

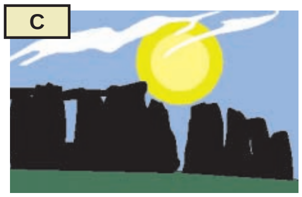
A



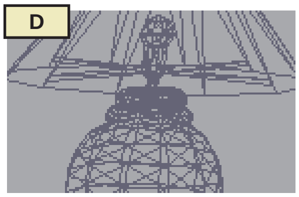
B



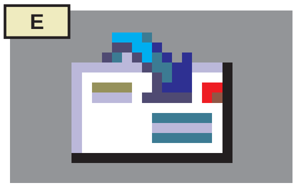
C



D



E



CheckIt!

GetIt?

While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 15.

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CHAPTER 16

Creating Desktop Video and Animation

What’s Inside?

Today, people are so accustomed to watching moving images on television that static computer screens somehow seem unsatisfying. Chapter 16 provides information on digital video and animation that can spark up Web pages, presentations, and even business software.

- **FAQs:**
  - What is digital video? 227
  - How do I transfer video footage to my computer? 228
  - How do I edit a digital video? 229
  - How do I finalize my video for DVDs, Web sites, and other uses? 230
  - What are the most popular video formats? 231
  - What is a codec? 232
  - What about animation? 233
- **Hardware:** Digital camcorders 234
- **Project:** Explore your media software 237
- **Issue:** Can dead celebrities come back to life? 240
- **QuickChecks** 241

What’s on the CD?

Wear your director’s beret and ascot for Chapter 16. When you’ve completed the screen tours and videos, you’ll be shouting, “Lights! Camera! Action!”

- Find out how to play videos on your PC 227
- Learn how to capture and transfer digital footage 228
- Discover how easy it is to edit a digital video 229
- Find out how to create DVDs with interactive menus 230
- Compare different video compression formats 232
- Take a look at the amazing CCD inside your camera 235

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FAQ What is digital video?

A video is a series of still frames projected at a rate fast enough to fool the human eye into perceiving continuous motion. **Digital video** uses bits to store color and brightness data for each pixel in a video frame. Digital video technology is used for most of today's films, YouTube videos, video conferencing, video phones, and television programs.

Digital video makes it easy to post, view, and download videos from the Web at news sites, video sharing sites, and online video stores. Unlike analog video stored on VHS tapes, digital video retains image quality no matter how many times it is copied. When you make a copy of a DVD movie in case the original is damaged, the copy preserves the same quality as the original.

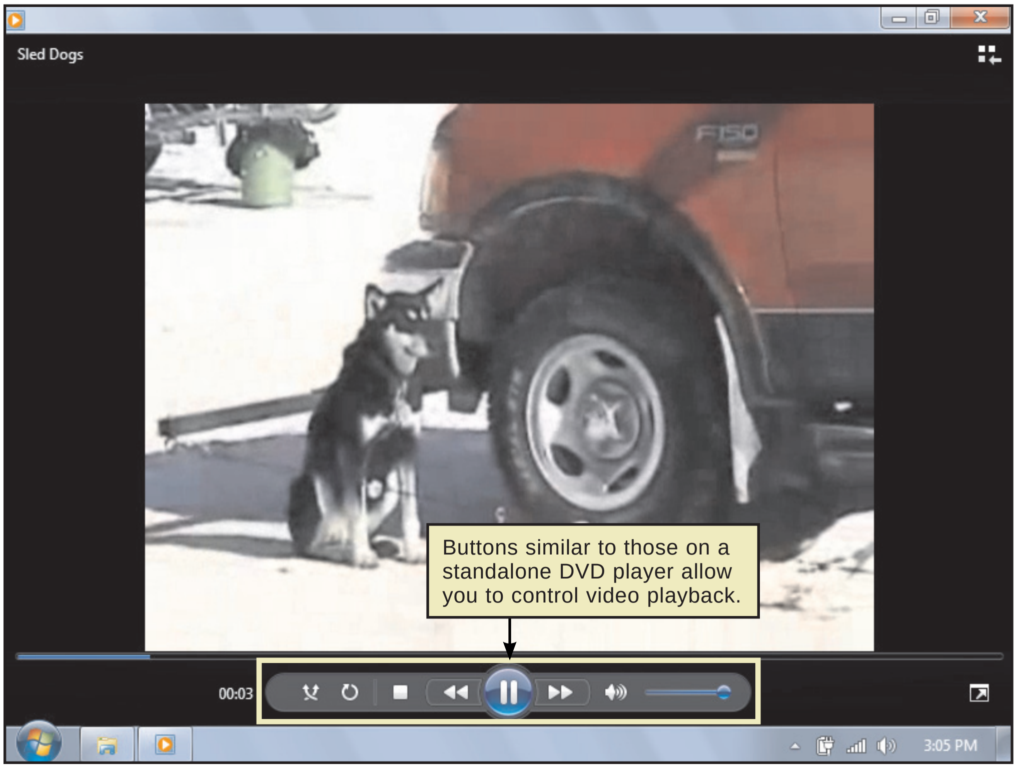
Videos in digital format can be easily manipulated on a personal computer, putting the world of movie-making at your fingertips. You can shoot digital video footage with a consumer-quality camcorder and use your personal computer to edit this footage into videos suitable for a variety of personal and professional uses, such as video wedding albums, product sales videos, training videos, and video scrapbooks. These videos can be stored on a hard disk or distributed on DVDs, videotapes, memory cards, or the Web.

Your computer might have a built-in video camera, sometimes called a **Webcam**, that stores data directly on the hard disk. Webcams are useful for video conferencing and video calling using VoIP or instant messaging services such as Skype and iChat. A creative use of Webcams gives deaf or speech-impaired individuals a communication system alternative to voice calling.

Digital videos can be displayed on a computer screen with popular video player software and browser plug-ins, such as Adobe Flash Player, Microsoft Windows Media Player, or Apple QuickTime Player. Click the Try It! button to find out how to use Windows Media Player to view videos on your PC.

Try It!

Figure 16-1



Buttons similar to those on a standalone DVD player allow you to control video playback.

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FAQ How do I transfer video footage to my computer?

Webcam video and video that you download from the Web or receive as an e-mail attachment is stored directly on your computer, but footage from external devices has to be transferred to your hard disk if you want to view it on-screen and edit it. Footage from analog sources, such as videotapes, has to be digitized as it is being transferred. The following points summarize the transfer process for the most popular video sources.

Digital camera. Transfer a memory card from your camera to your computer or connect your camera to your computer with a cable, and use your video editing software to control the data transfer. The camera captures data in digital format, but the software might convert the data into a different file format more appropriate for editing.

VHS tape, analog video camera, or television broadcast. The data on VHS tapes, analog digital cameras, and television broadcasts is in analog format, so it has to be converted into a digital data stream. You can use an external **video capture device**, available as an expansion card that you install inside a computer system unit, or as a standalone device that can be attached to a computer with a cable. You can also use an import routine provided by software such as Windows Live Movie Maker.

DVDs. DVD movies are stored in a format that most video editing software cannot directly manipulate. DVD data might also be encrypted to protect it from illegal copying. DVD ripping and decryption software can convert and decrypt data from any DVD you insert into your computer's DVD drive, and then copy it to your computer's hard disk. In some countries, video decryption is illegal, so make sure your activities conform to local laws.

Cell phone. If your cell phone can sync with your computer using a cable, then you can probably transfer videos using such a setup. Otherwise, you can e-mail the video from your phone to your computer. When it arrives as an e-mail attachment, you can save it as a standalone file. Most mobile phone videos can be viewed with a standard media player, such as QuickTime or Windows Movie Player.

Click the Play It! button to learn more about shooting video footage and transferring it to your PC.

Play It!

Figure 16-2

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FAQ How do I edit a digital video?

The process of transferring or capturing raw video footage produces a file on your computer's hard disk that you can edit using software tools. **Video editing software** helps you cut out unwanted frames, add special effects, arrange segments, overlay a soundtrack, and designate transitions from one segment to the next.

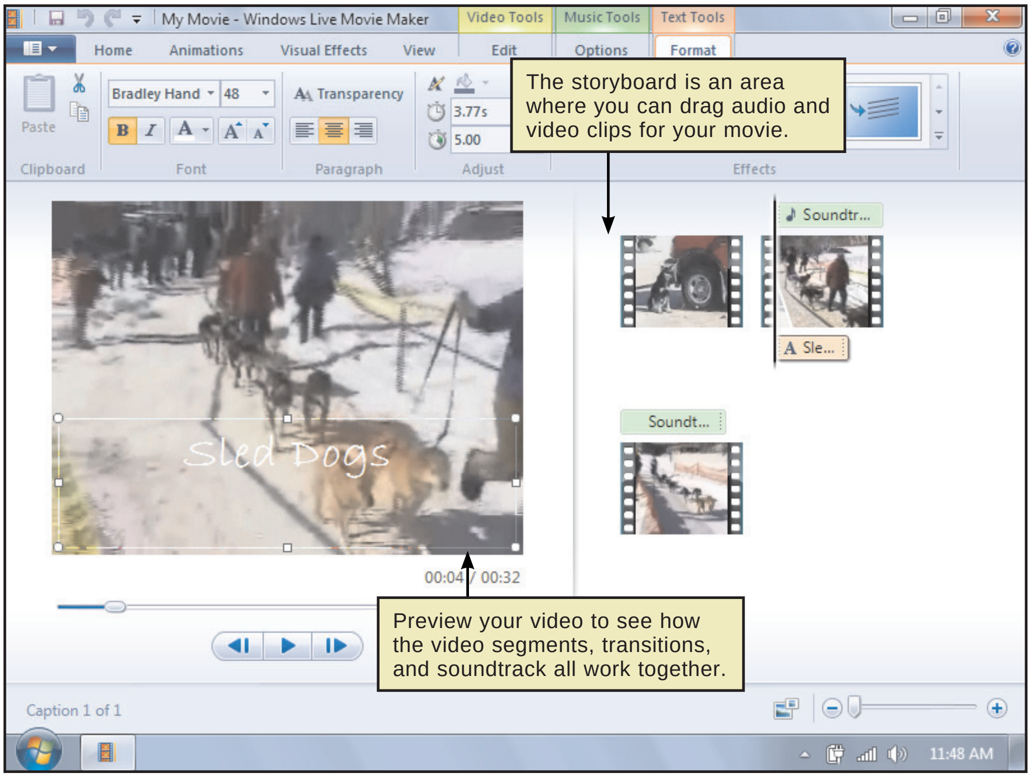
Popular consumer-level video editing software includes Adobe Premiere Elements, Corel VideoStudio Pro, Windows Live Movie Maker, and Cyberlink PowerDirector. More expensive software, such as Apple Final Cut Pro, is designed for professional film editors and has been used to produce feature-length films, such as *Cold Mountain*, *Corpse Bride*, *Where the Wild Things Are*, *The Curious Case of Benjamin Button*, and *Napoleon Dynamite*.

To begin the editing process, open your video editing software and import any files that contain photos, video footage, or audio clips for the final video. Once imported, you can drag these elements onto a storyboard that represents the video stream. Your video editing software also allows you to insert predefined transition effects that control the way one clip blends into another—for example, by fading, flipping, overlaying, or simply cutting to the next scene. To complete your video, you can add titles and other special effects.

Click the Try It! button to learn the basic steps of video editing: importing video and sound clips, arranging the clips in sequence, selecting transition effects, and previewing the final masterpiece.

Try It!

Figure 16-3


My Movie - Windows Live Movie Maker
Video Tools
Music Tools
Text Tools
Home
Animations
Visual Effects
View
Edit
Options
Format
Paste
Bradley Hand
48
Transparency
3.77s
5.00
Clipboard
Font
Paragraph
Adjust
Effects
Soundtr...
A Sle...
Soundt...
Sled Dogs
00:04 / 00:32
Caption 1 of 1
11:48 AM

The storyboard is an area where you can drag audio and video clips for your movie.

Preview your video to see how the video segments, transitions, and soundtrack all work together.

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FAQ How do I finalize my video for DVDs, Web sites, and other uses?

Video editing software allows you to preview your entire video production, complete with sound and transitions. When you're satisfied with your work, the next step is to specify output settings. The settings you select for your video depend on its intended use.

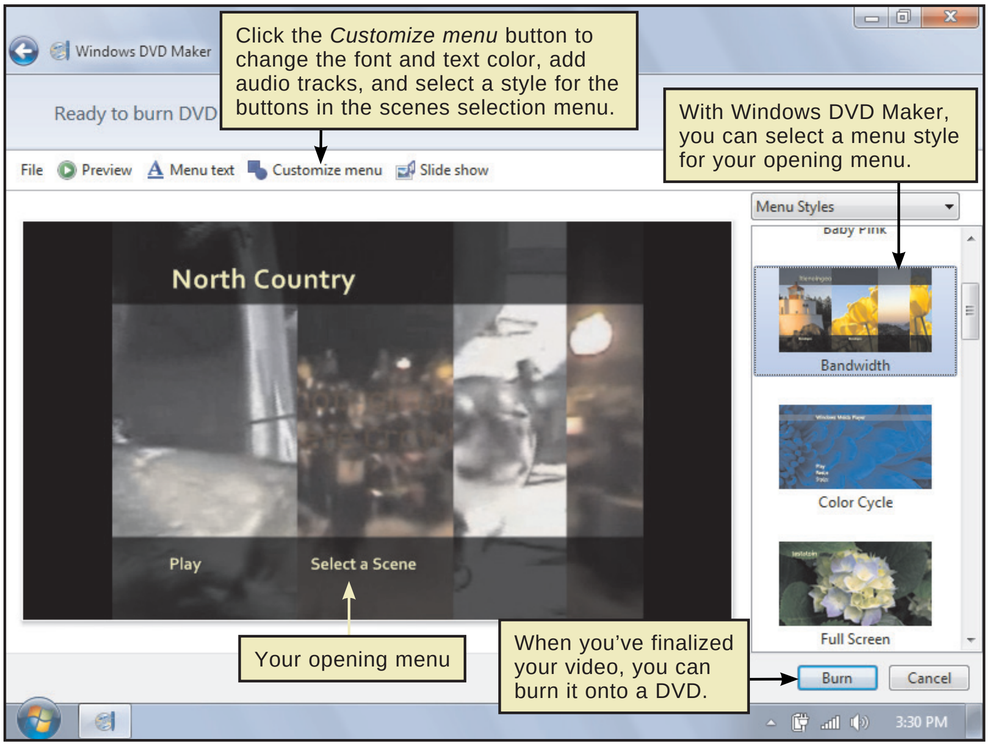
Some entry-level video editing software allows you simply to select a use for your video, such as sending it as an e-mail attachment, posting it on the Web, publishing it on YouTube, or viewing it from your local hard disk. Alternatively, your software might give you the option of selecting a maximum file size. For example, if you are planning to send a video as an e-mail attachment, you might limit the size to 1 MB.

If your software doesn't offer automated settings, you can manually select settings for aspect ratio, display size, frames per second, and file format. **Aspect ratio** refers to the relative width and height of the video frame; widescreen is 16:9 and fullscreen is 4:3. **Display size** corresponds to the resolution of the video window. A typical display size for desktop and Web video is 320 x 240. DVD video has a resolution of 720 x 480. High-definition video has a resolution of 1920 x 1080. **Frame rate** is the number of frames displayed per second (fps). Standard frame rates for digital videos range between 24 and 30 fps.

Video files that you plan to distribute on DVDs and play in standalone DVD players have to be laid out in a specific format called DVD-Video. If your video editing software does not offer DVD output, you can use DVD authoring software. Click the Try It! button to see how you can use DVD authoring software to add an opening menu, specify a scene selection menu, and add special features just like on a professional DVD.

Try It!

Figure 16-4



Click the *Customize menu* button to change the font and text color, add audio tracks, and select a style for the buttons in the scenes selection menu.

With Windows DVD Maker, you can select a menu style for your opening menu.

Your opening menu

When you've finalized your video, you can burn it onto a DVD.

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FAQ What are the most popular video formats?

There is no single, standard file format for digital video. The files posted on YouTube are stored in a different type of file than videos posted at the iTunes Store. You can think of the files that store digital videos as containers because they can hold video and audio streams. Digital video file formats are sometimes referred to as **container formats** because they are essentially a receptacle for the elements of a video.

Video player software deals with one or more video file formats. By looking at the file extension or file type, you can determine a video's format and the appropriate software necessary to play it. Popular video container formats include the following:

QuickTime Movie (MOV) is a popular container format that packages media in files with .mov extensions. Use Apple's QuickTime Player to play these files.

Advanced Systems Format (ASF) containers hold Windows Media Video (WMV) files and are usually identified by .wmv extensions. Windows Media Player is designed to work with these files.

Audio Video Interleave (AVI) containers were one of the original video file formats, and are still popular with file-sharing communities because of the availability of open source players.

MPEG offers a variety of container formats, most notably .mp4 and .m4v files, used by Apple's iTunes Store for distributing movies, television shows, and podcasts. Apple iTunes software can be used to play videos stored in these formats.

Flash Video (FLV) is a proprietary video format popular for video distributed on YouTube, CNN.com, and other Web sites. These files can be identified by their .flv or .swf extensions. They can be played using the standalone Adobe Flash Player or the Flash browser plug-in.

RealMedia is a proprietary multimedia format created by RealNetworks and popular for Web video. RealMedia files have an .rm extension and can be played using RealPlayer multimedia software.

Video Object File (VOB) is the standard format for videos distributed on commercial DVDs. Files are stored with .vob, .ifo, and .bup extensions.

Ogg is an open source container that produces video files with .ogv extensions. Built-in browser support for playing Web-based Ogg files is included in Mozilla Firefox, Google Chrome, and Opera. Helix is a popular standalone player for Ogg videos.

Digital videos can be converted from one file format to another through a process called **transcoding**. If you want to move a video into a different file format, you can check to see if your video editing software offers a conversion, export, or transcoding option. If not, you can find transcoding software on the Web.

Transcoding is quite common. For example, YouTube, a popular video sharing Web site, accepts videos in a variety of formats, but it automatically transcodes them into Flash video so that all the clips are of uniform quality and can be viewed with Flash Player. Transcoding can cause loss of quality, so avoid transcoding an already transcoded video file.

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FAQ What is a codec?

You might have encountered video files that don't play on your computer. These files often seem to be in standard formats with .wmv or .mov file extensions. To successfully play a video on your computer, however, your media player has to be equipped to deal not only with the container format that holds the video, but also with the codec used to compress the video. A **codec** (compressor/decompressor) is the software that compresses a video stream when a video is stored, and decompresses the file when the video is played.

The codec used to compress a video also must be used to decompress the video when it is played. If you don't have the right codec, your computer cannot play the video. Windows Live Media Player automatically attempts to locate missing codecs and installs them when needed. When using other software, you might see a message such as "A codec is needed to play this file." You can manually search for the codec on the Web, download it, and install it. Popular codecs include MPEG, Indeo, Cinepak, DivX, QuickTime H.264, Theora, and Windows Media Video.

When creating your own videos, you should use one of the codecs included in popular video players. Each codec uses a unique algorithm to shrink the size of a video file. A **compression ratio** indicates the ratio of compressed data to uncompressed data. A video file with a high compression ratio, such as 35:1, has more compression, a smaller file size, and lower image quality than a file with a smaller compression ratio, such as 5:1. You might have to experiment with compression ratios a bit to find the best balance between file size and image quality.

An alternative indication of compression, **bit rate**, refers to the amount of data transferred per second as a video plays. Uncompressed video files contain a huge number of bits per frame, so smooth playback requires a high bit rate, such as 340 Kbps. Compressed files contain fewer bits per frame and play back more smoothly at lower bit rates, such as 38 Kbps, offered by slower Internet connections. If you are asked to select a bit rate, realize that selecting a low bit rate produces a file that requires less storage space but is lower quality than a video output at a high bit rate. Click the Play It! buttons to compare video and audio quality produced by different compression settings.

Figure 16-5

Play It!
File type: WMV
Frame rate: 10
Bitrate: 90 Kbps
File size: 359 KB

Play It!
File type: WMV
Frame rate: 15
Bitrate: 448 Kbps
File size: 1177 KB

Play It!
File type: WMV
Frame rate: 30
Bitrate: 928 Kbps
File size: 2448 KB

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FAQ What about animation?

Computer animation, sometimes referred to as **CGI** (computer-generated imagery), generates moving images from 2D or 3D objects. Animated special effects for movies, animated game characters, and environments for 3D computer games begin as a sequence of 3D images, in which one or more objects are moved or otherwise changed between each frame.

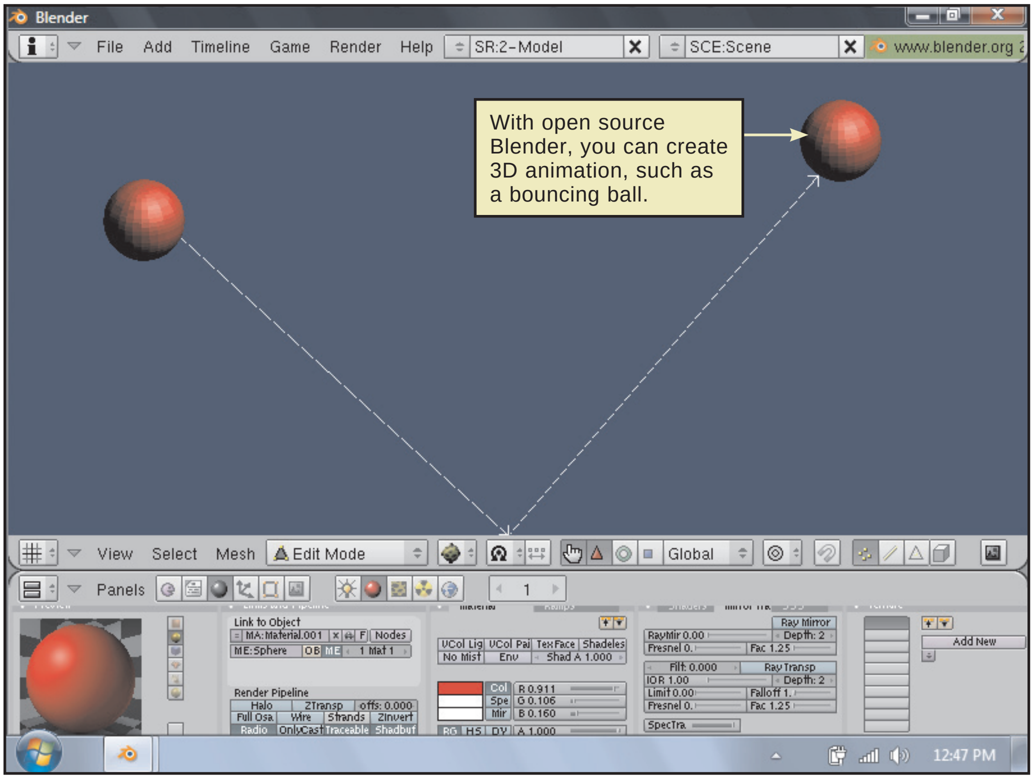
In traditional hand-drawn animation, a chief artist draws **keyframes**, and then assistants create each of the in-between images—24 of these images for each second of animation. For 3D computer animation, a computer creates in-between images by moving objects and producing a series of new images. All the images are then combined into a single file, essentially creating a digital movie.

Graphics design companies, such as Pixar Animation Studios and DreamWorks, use 3D animation techniques to produce feature films as well as special effects. The first full-length animated 3D movie was *Toy Story*, released in 1995 by Walt Disney Studios and Pixar. Since then, digitally animated films have become increasingly sophisticated.

You can create 3D animations on a standard PC with commercially available software. However, professional 3D software—such as Autodesk Maya and Autodesk 3ds Max—is expensive and has a steep learning curve. If you want to dabble in 3D animation before making an expensive software investment, you might try Smith Micro Poser, DAZ Studio, or open source Blender.

Animation software provides tools to create shapes and move them along a specified track. Simple 3D objects like the ball in Figure 16-6 can be animated in real time. More complex scenes require a considerable amount of render time to transform wireframe objects into the final animation sequence.

Figure 16-6



With open source Blender, you can create 3D animation, such as a bouncing ball.

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Hardware

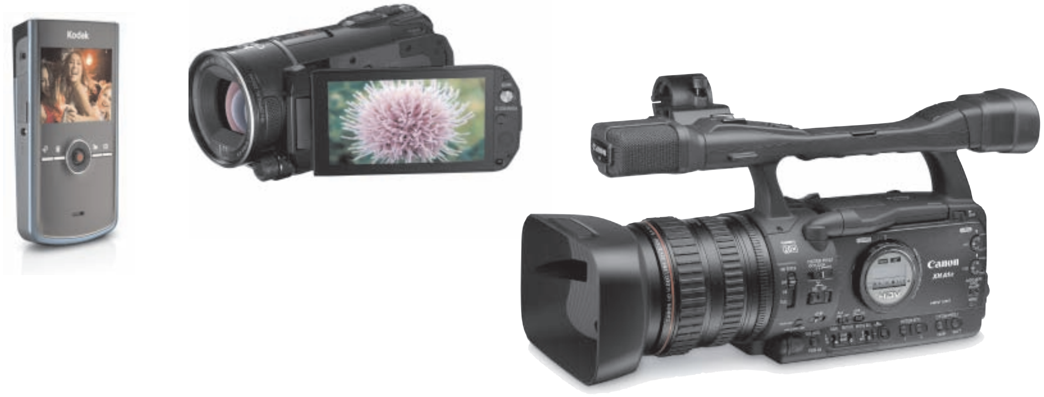
Digital camcorders

A **digital camcorder** (DV camcorder or digital video camera) is a portable electronic device that captures and records visual and auditory elements of a scene containing moving objects. Although many cell phones and still cameras are capable of recording short video segments, and although some video cameras can capture still images, a digital camcorder's primary function is video recording.

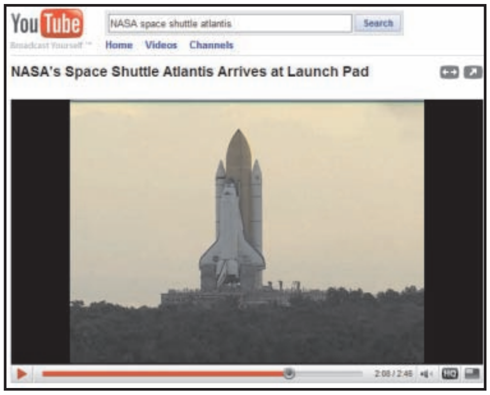
Camcorders are produced by many well-known camera manufacturers, including Canon, JVC, Kodak, Panasonic, and Sony. Budget camcorders priced below US$300 are suitable for home movies of holiday gatherings, Little League games, and household inventories; they are good knock-about cameras that produce acceptable footage for posting to YouTube, Facebook, and other social networking sites.

Amateur videographers can step up to a prosumer-quality camera in the US$400 to US$1,000 price range, with better optics and audio capabilities. Professional videographers and independent filmmakers can easily pay US$5,000 for cameras with excellent optics, connections for audio and lighting accessories, digital effects, and touch-screen displays.

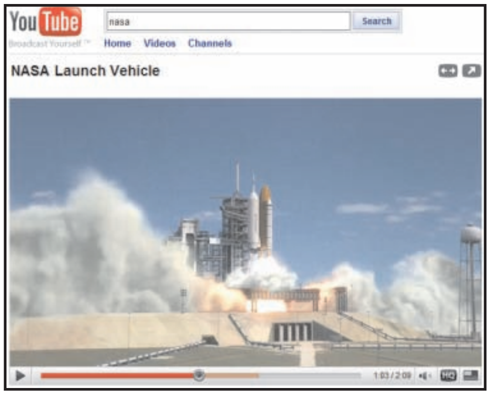
Figure 16-7



Like computer displays, digital camcorders are available in standard definition (SD) and high-definition (HD) models. Some camcorders give you the choice of filming in SD or HD modes. HD video is stored in **AVCHD** (Advanced Video Codec High Definition) files, and requires approximately twice the storage space as SD video. A camcorder with storage capacity for seven hours of standard-definition video can only store about four hours of high-definition AVCHD video.


YouTube
Broadcast Yourself™
NASA space shuttle atlantis
Search
Home
Videos
Channels
NASA's Space Shuttle Atlantis Arrives at Launch Pad
2:08 / 2:46
HQ

SD video is typically 640 pixels wide by 480 pixels high with a 4:3 aspect ratio that produces a "square" picture, rather than a widescreen one.



HD resolutions produce widescreen 16:9 aspect ratio pictures at resolutions of 720p, 1080i, or 1080p.

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Hardware
(continued)

A digital camcorder performs two major functions: It captures a series of images using camera components, and it stores images using recorder components similar to a digital video recorder.

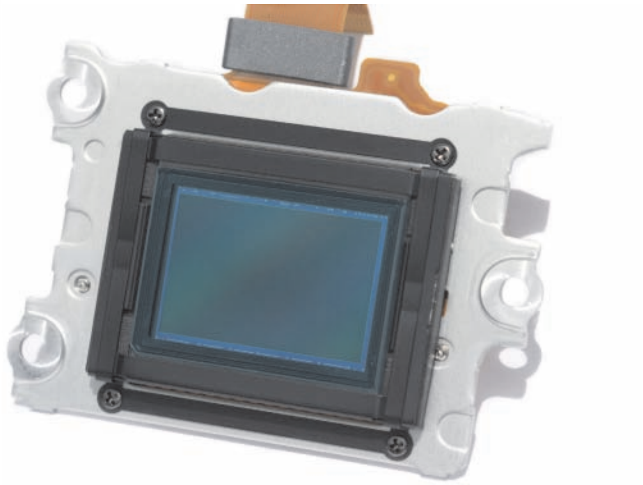
To capture an image, the camera's lens focuses light onto a small image sensor called a **charge-coupled device** (CCD). A CCD contains a grid of tiny light-sensitive diodes called **photosites**. CCDs vary in size from 0.5" to 2.5." A one-half-inch square CCD can contain up to 500,000 photosites. Each photosite detects the brightness and color for its tiny piece of the total image.

A CCD's photosites correspond to pixels. The more pixels used to capture an image, the higher its resolution, and the better the resulting picture. Cameras with larger CCDs produce higher quality images. Some cameras contain multiple CCDs, which enhance the color quality of a camera's output.

To create video footage, a camcorder CCD must take many pictures every second, which are combined to give the impression of movement. Click the Play It! button to learn more about CCDs.

Play It!

Figure 16-8



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Hardware
(continued)

After an image is captured by the camcorder's camera components, the image data is stored using the camcorder's recorder components. Digital camcorders convert each pixel into digital data, which can be stored on a variety of magnetic, optical, and solid state media. A camcorder's "format" refers to the technology used to store video data onboard the camera. Camcorder formats include memory cards, solid state drives, hard drives, mini DVDs, and tape.

Memory cards. Solid state memory cards are compact and lightweight so they don't add bulk to a camcorder. They can be removed when full and replaced with a blank card so that you don't miss any exciting action. Most computers have memory card readers, which makes it easy to pop the card out of your camcorder and transfer footage to your computer without messing with connecting cables. Memory cards come in a variety of form factors, storage capacities, and speeds. An 8 GB memory card can store approximately two hours of HD video recorded at the highest quality setting.

Figure 16-9

SanDisk
VideoHD
LOCK
120 min
8GB
SanDisk

SDHC and SDHX memory cards are the most popular camcorder memory cards. Although they look like digital camera SD cards that max out at 4 GB, SDHC cards are available with 4, 8, 16, or 32 GB capacity. These cards are available in four speeds: Class 2, 4, 6, and 10. Class 2 cards are adequate for SD camcorders, but Class 6 cards are recommended for HD cameras.

Solid state hard drive (SSD). A solid state drive is built into a camcorder and, unlike a memory card, is not typically removed from the camera. SSDs have more capacity and speed than most memory cards, but they are less versatile because they cannot be removed when full.

Built-in hard drive. Camcorder hard drives come with varying amounts of capacity, typically ranging from 30 GB to 120 GB. That capacity translates into several hours of HD video recorded at the highest quality setting. The mini-hard drives used in camcorders require very little space, but they are a bit less durable than solid state memory cards or SSDs. When your camera's hard disk is full, videos have to be transferred to a computer or archival storage device, usually over a USB cable connection. Some hard drive camcorders also provide slots for memory cards, so you can continue filming when the hard disk becomes full.

Mini-DVD or Blu-ray. Some camcorders record directly on Mini-DVD or Blu-ray discs that can be removed from the camera and inserted directly into a computer DVD drive. They also work directly on many standalone DVD or Blu-ray players. Mini-DVD storage is slower than solid state or hard drive, and has considerably less storage capacity; usually less than an hour of video. This format is less popular than solid state or mini-hard drives.

MiniDV tape. Tape storage is a proven technology, but one that is rapidly being replaced by the convenience of solid state memory on consumer-level camcorders. Tapes are available in recording lengths of 30, 60, and 80 minutes. When a tape is full, it can be replaced with a blank one. Transferring video from the camera to a computer requires a cable and a FireWire or I.Link port. The transfer process occurs in real time, so one hour of video footage requires one hour of transfer time. Professionals love tape formats because they provide excellent picture and audio quality.

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Project

Explore your media software

The vast selection of video editing and DVD authoring software makes it fairly simple to create your own movies by combining video clips and pictures with music, narration, transition effects, and animated titles. Digital home movies are easy to share via the Web, e-mail, and CDs or DVDs.

When you have completed the project, you should be able to:

- Create your own movie using the AutoMovie feature.
- Add transitions, titles, and narrations.
- Optional: Burn a movie you've created onto a CD or DVD.

Requirements: This project requires Microsoft Windows 7, Paint, Windows Live Movie Maker, and Windows Media Player. A blank DVD or CD is optional.

Deliverables:

1 A file containing your movie in a format that you can e-mail to your instructor

2 Optional: A DVD or CD of your movie

CopyIt!

1. Click the Copy It! button to copy the Prj16.zip file to your Videos folder.

2. Use the Start menu's Search box to open Prj16.zip. Click the *Extract all files* button on the toolbar. By default, the extracted files will be placed in a folder called Prj16. Click the Extract button to accept the default location. The extracted files Biking, Luge, and Skiing are displayed.

3. Suppose you want to create a movie combining all three videos and utilizing transition effects, narrations, and special titles. To accomplish this, you can use Windows Live Movie Maker. You should have Windows Live installed on your computer. If not, follow the instructions on page 221 to download it free of charge. Use the Start menu's Search box to open Windows Live Movie Maker.

4. Click the *Add videos and photos* button on the Home tab. Navigate to the Prj16 folder. Press the Shift key while you select the three video files, then click the Open button. The video files are displayed in the Movie Maker storyboard.

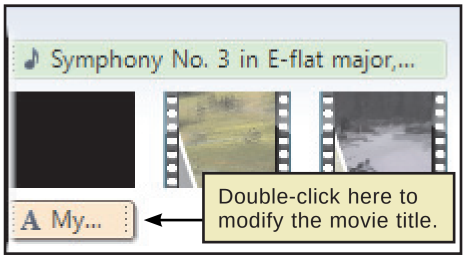
5. Click the *Add music* button on the Home tab. Navigate to the Sample Music folder, which is located in the Public Music folder in the Music library. Select one of the songs, then click the Open button.

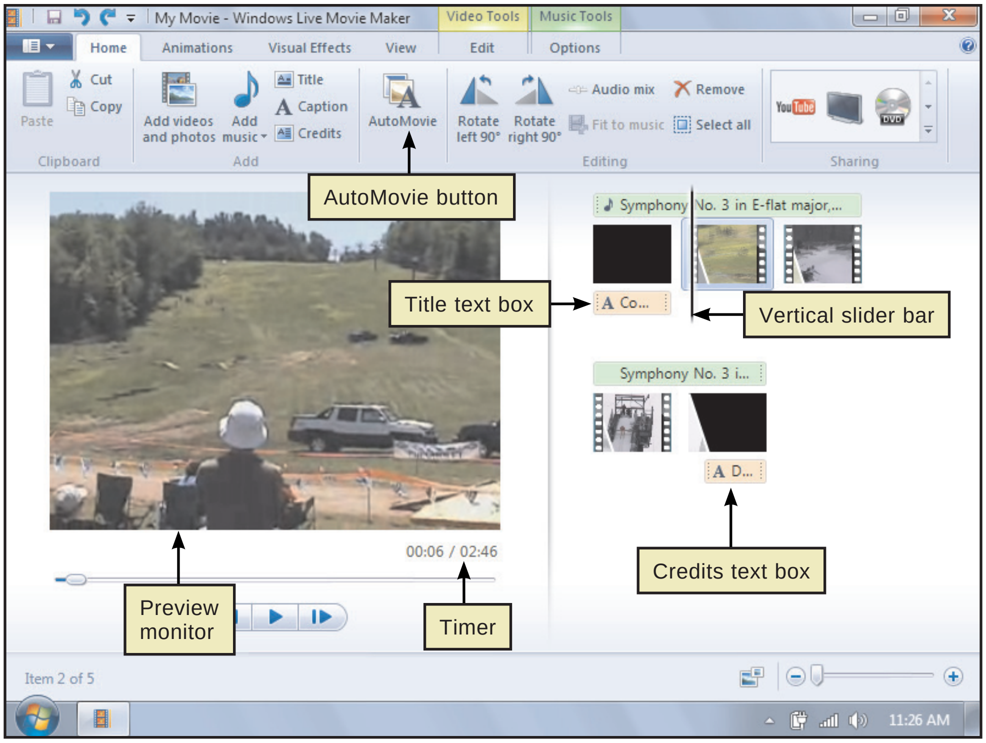
6. The simplest way to create a movie is to use the AutoMovie feature. Click the AutoMovie button on the Home tab. Click the OK button if a message appears asking if you want AutoMovie to help you make a movie. Click the Close button when the process is complete.

• Explore your media software (continued)

7. Double-click the text box under the title screen. Change the title to **Competition Highlights**. Resize the text box as necessary so that the text fits.

8. Next, double-click the text box containing "The End" located under the last clip. Change this text to **Directed by** and then add **[Your Name]**. Resize the textbox as necessary so that the text fits.


Symphony No. 3 in E-flat major,...
A My...
Double-click here to modify the movie title.


My Movie - Windows Live Movie Maker
Video Tools
Music Tools
Home
Animations
Visual Effects
View
Edit
Options
Paste
Cut
Copy
Clipboard
Add videos and photos
Add music
Title
Caption
Credits
Add
AutoMovie
Rotate left 90°
Rotate right 90°
Audio mix
Fit to music
Remove
Select all
Editing
Sharing
AutoMovie button
Title text box
Vertical slider bar
Symphony No. 3 in E-flat major,...
A Co...
Symphony No. 3 i...
A D...
Credits text box
00:06 / 02:46
Preview monitor
Timer
Item 2 of 5
11:26 AM

9. Click the first clip and then click the Play button below the preview monitor. Preview the movie and make sure that your name appears in the credits.

10. Notice that you can move to any frame of your movie by dragging the vertical slider bar located in the storyboard area. The location of the slider bar is indicated by the timer located under the preview monitor.

11. The Biking clip is pretty long. You can trim it to only include the most exciting action by moving the vertical slider bar to 00:30 seconds and then clicking *Set start point* on the Video Tools Edit tab.

12. Trim off a few seconds from the end of the clip by moving the vertical slider bar to 00:25 seconds and then clicking the *Set end point* button. Preview your video.

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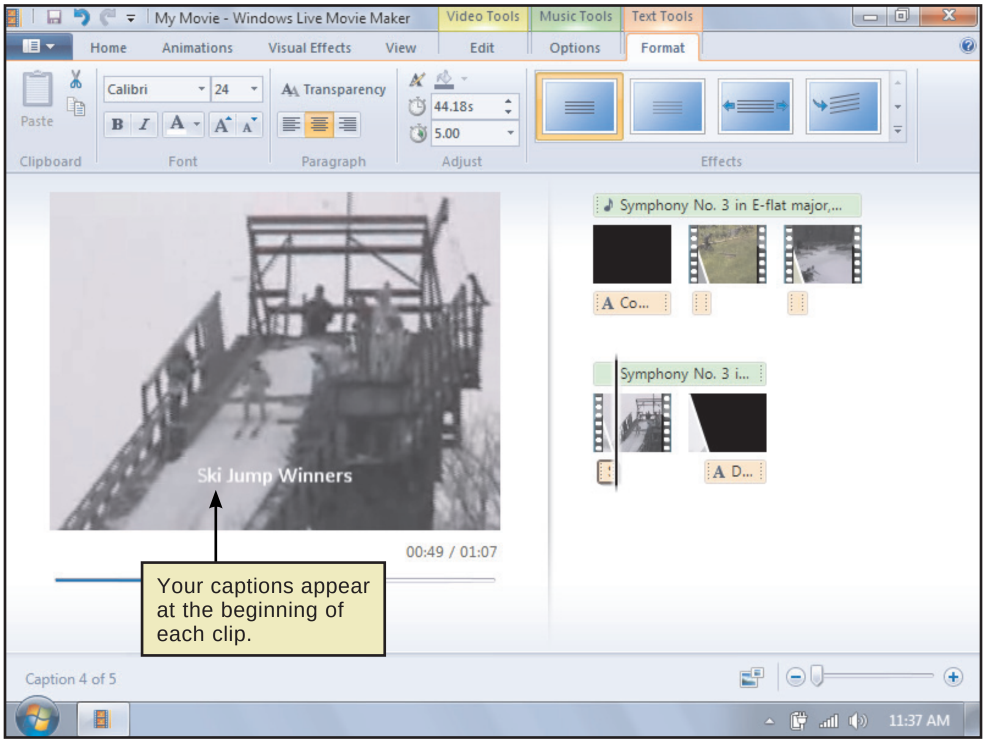
• Explore your media software (continued)

13. Trim the remaining two clips until your movie is 50 to 60 seconds long.

14. Movie Maker automatically adds a crossfade transition between clips, but you can select different transitions. Click the Animations tab and then click the beginning of the bicycle clip. Click the toolbar box containing the circle transition.

15. Explore other options on the Animations and Visual Effects tabs.

16. Click the beginning of the Biking clip. Click the Caption button on the Home tab, and then enter **Mountain Bike Finals**. Add the caption **Luge Semi-finals** for the Luge clip, and **Ski Jump Winners** for the Skiing clip.


My Movie - Windows Live Movie Maker
Video Tools
Music Tools
Text Tools
Home
Animations
Visual Effects
View
Edit
Options
Format
Paste
Clipboard
Calibri
24
Font
Transparency
Paragraph
44.18s
5.00
Adjust
Effects
Symphony No. 3 in E-flat major,...
A Co...
Symphony No. 3 i...
A D...
Ski Jump Winners
00:49 / 01:07
Caption 4 of 5
11:37 AM

Your captions appear at the beginning of each clip.

17. Preview your completed movie. If you are dissatisfied with any segment, revise it. To save your movie, click the More ▾ button in the Sharing group on the Home tab. Movie Maker offers a range of hi-res and low-res output options. Because you could be e-mailing your movie to your instructor, select the *For e-mail and instant messaging* option. Name the movie **Project 16** [**Your Name**], and save it in your My Videos folder.

18. To see your final product, open Windows Media Player and play your movie.

19. Optional. Click the DVD icon in the Sharing group. Give this version of your movie a name and click Save. When the process is complete, the DVD Maker window appears. Click Next, then click Burn. Insert a blank CD or DVD when prompted. When the burn is complete, close all windows. There is no need to save the project. Test your CD or DVD with Windows Media Player before submitting it to your instructor.

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Issue

Can dead celebrities come back to life?

John Lennon appears in a 2009 commercial promoting One Laptop per Child. Frank Sinatra performs in concert five years after his death. Paula Abdul dances with Groucho Marx (d. 1977) and flirts with Cary Grant (d. 1986) in a Diet Coke commercial. And Gene Kelly (d. 1996) trades in his 1950s moves and breakdances in a Volkswagen ad. How? Through technological wizardry, of course.

By digitally manipulating the voice and image of John Lennon, he appears to endorse a project that did not yet exist at the time of his death. “You can give a child a laptop and more than imagine. You can change the world,” says the long-haired ex-Beatle, wearing his signature wire-framed glasses.

For the Volkswagen ad, Gene Kelly’s face is digitally superimposed over the face of dancer David Bernal. But it certainly looks like Gene Kelly doing funky street-wise breakdance moves.

The use of dead celebrities represents the latest, most ambitious example of an eerie trend in show business and marketing. These deceased movie stars and singers sell everything from beer to vacuum cleaners to concert tickets. Celebrities including John Wayne, Fred Astaire, and Lucille Ball have appeared posthumously on TV commercials.

Some countries have enacted “right of publicity” laws that prohibit unlicensed exploitation of deceased celebrities. However, the application of these laws to digital technology has not yet been fully explored in the courts. Outstanding issues include whether a multimedia developer has a right to create a digital image of a deceased celebrity, even if there is no intent to use the image for commercial gain. Furthermore, would the laws that prohibit using the image of a deceased celebrity also prohibit the use of a digital character that was created from the image of a celebrity look-alike?

The issue becomes even more hazy when you consider that a digital character could combine the traits of several celebrities. In the music industry, it is a violation of copyright law to create mashups from other artists’ compositions without permission. Would similar restrictions prevent a developer from creating a digital actor who is a composite of Humphrey Bogart, Clark Gable, and Michael Jackson?

What do you think?

1. Have you seen deceased celebrities featured in any recent TV ads or films? ○ Yes ○ No ○ Not sure
2. Do you think that multimedia developers should have the right to create a digital character by digitizing a celebrity look-alike? ○ Yes ○ No ○ Not sure
3. Should laws prohibit the creation of digital characters based on the composite traits of several deceased celebrities? ○ Yes ○ No ○ Not sure

Save It!

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QuickCheck A

1. Digital video file formats, such as MPEG and QuickTime Movie, are also called ☐ formats because they can hold video and sound clips.
2. True or false? When you make a copy of a DVD movie, the copy typically does not have the same quality as the original. ☐
3. The video ☐ technique that you select for a desktop video will affect its quality and file size.
4. The software that compresses a video stream when a video is stored and decompresses the file when the video is played is called a(n) ☐ .
5. True or false? Digital camcorder formats include MPEG, BMP, and SDVA. ☐

CheckIt!

QuickCheck B

For each task described below, indicate the letter of the appropriate tool.

1. Add opening and scene selection menus to a video ☐
2. Digitize a video from a camcorder or VCR ☐
3. Compress a video ☐
4. Capture images in a digital camera ☐
5. Create a video ☐

Video capture device

A

CCD

B

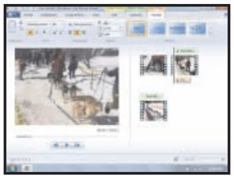
DIVX

Codec

C

DVD authoring software

D



Windows Live Movie Maker

E

CheckIt!

GetIt? While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 16.

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CHAPTER 17

Looking “Under the Hood”

What’s Inside?

How does your computer’s performance compare? Is it a hot machine, or just an average performer? Chapter 17 gets into the nuts and bolts—more specifically, the chips and circuits—of computers. You learn what goes on inside the system unit and discover various ways to rate your computer’s performance.

- **FAQs:**
  - How does a computer work? 243
  - What do RAM and processing circuitry look like? 244
  - How does data get into chips? 245
  - Does a computer use the same code for all types of data? 246
  - How does software tie into chips, codes, and circuits? 247
- **Hardware:** Microprocessors 248
- **Project:** Find the technical specifications for your PC 251
- **Issue:** Who invented the first electronic digital computer? 254
- **QuickChecks** 255

What’s on the CD?

It’s impossible to actually see what’s happening inside the chips on your PC’s system board, so Chapter 17 contains animated tours to help you visualize the way computers work.

- Trace the path of input, processing, output, and storage 243
- Learn about those mysterious black chips on your PC’s system board 244

FAQ How does a computer work?

A computer works by manipulating data in various ways. Technically, **data** refers to the symbols that describe people, events, things, and ideas. A computer works with data in four ways: (1) accepting input data, (2) processing data, (3) producing output data, and (4) storing data.

Input is the data that goes into a computer. A computer gets input from many sources, including the keyboard, peripheral devices, and disk drives. What happens to this input? The computer puts it in RAM (random access memory). Recall from Chapter 1 that RAM is a temporary holding area for data. You might think of it as a lounge area for computer data—a place for it to “hang out” until it is processed, stored, or displayed.

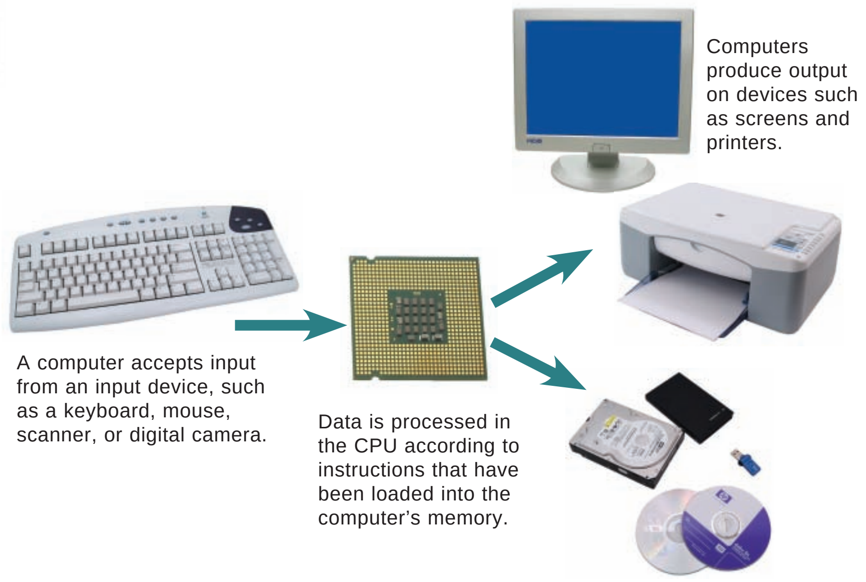
How does a computer know what to do with the data that’s in RAM? In addition to data, RAM holds instructions that originate from the software that’s running. These instructions tell the computer what to do. A computer’s processing circuitry “reads” the instructions, then processes the data accordingly. **Processing data** means manipulating it in some way. A computer might process numeric data by performing a calculation. It might process data in a list by sorting alphabetically, or it might process the dots in an image by changing their colors. After processing ends, the resulting data is returned to RAM.

Sometimes an instruction indicates that the computer should transfer data from RAM to a device, such as a printer, modem, or display screen. The data sent to these devices is called **output**. Other instructions might direct the computer to transfer data from RAM to a storage device, such as a hard disk drive. This process of **storing data** moves it from the temporary RAM “lounge area” to a more permanent destination.

When you think about how a computer works, remember that input data arrives in the computer’s RAM, then instructions in RAM tell the computer how to process, store, or output this data. Click the Play It! button to see how it works.

Play It!

Figure 17-1



Computers produce output on devices such as screens and printers.

A computer accepts input from an input device, such as a keyboard, mouse, scanner, or digital camera.

Data is processed in the CPU according to instructions that have been loaded into the computer’s memory.

A computer uses disks, CDs, DVDs, and flash drives to permanently store data.

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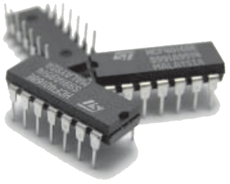
FAQ What do RAM and processing circuitry look like?

RAM and processing circuitry are contained in “chips” inside your PC’s system unit. **Chip** is a nickname for an integrated circuit (sometimes called a microchip). An **integrated circuit** is a thin slice of silicon that has been etched with microscopic circuitry.

Different kinds of chips are designed to perform different tasks. For example, a microprocessor chip carries out most of the processing work that takes place in your PC. RAM chips temporarily hold data. One or more ROM chips (read-only memory chips) hold the instructions that your PC uses to boot up. Other chips perform support activities to keep the data moving quickly and smoothly from input devices to output devices and storage devices.

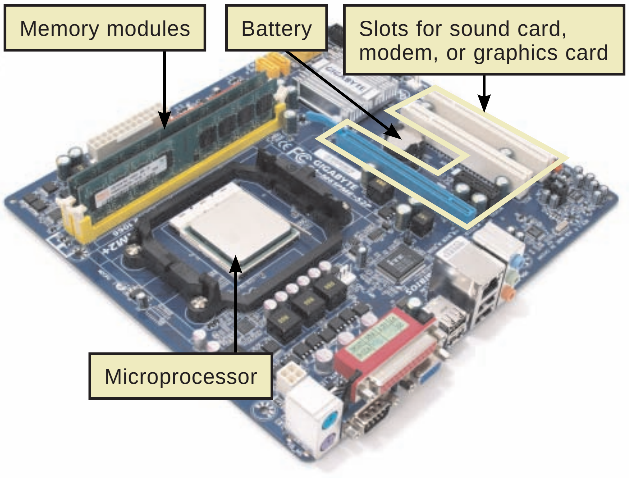
A chip is housed in a small, black, rectangular **chip carrier**. Thin wire “feet,” which extend from the carrier, can be soldered directly to a circuit board or plugged into a chip socket on a circuit board. A **circuit board** contains electrical pathways that allow data to travel between chips. In a typical PC, a fairly large circuit board—called the system board, motherboard, or main board—houses the microprocessor chip, ROM chips, and a variety of support chips.



A series of RAM chips are connected to a small circuit board called a **memory module**. Memory modules plug into special slots on the system board, allowing data to flow between RAM chips and the microprocessor chip. Other small circuit boards—such as a graphics card, sound card, or modem—also plug into the system board, allowing data to travel between RAM and input and output devices. Click the Play It! button to learn more about the chips on your PC’s system board.

Play It!

Figure 17-2



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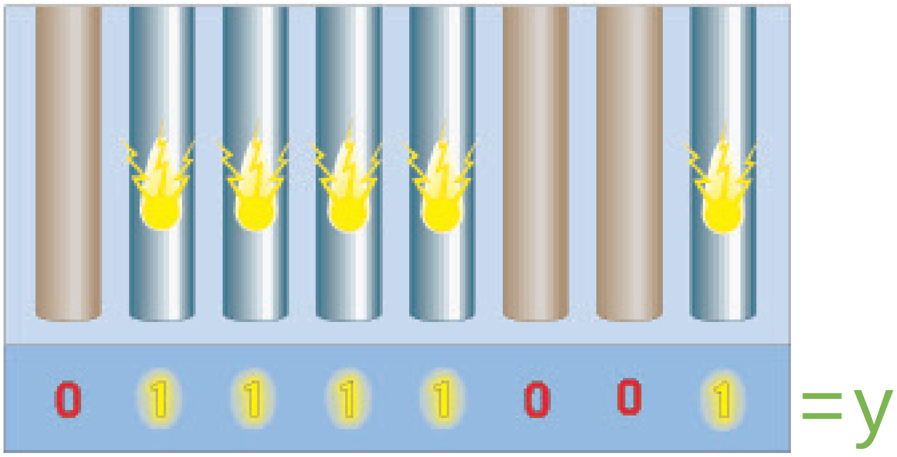
FAQ How does data get into chips?

Your intuition probably tells you that miniature letters, pictures, and other kinds of data don't somehow squirt through the electronic circuitry inside your PC. Instead, your PC works with data that has been converted into a code and then into electronic signals, which can easily travel through circuits on chips and circuit boards. This treatment of computer data is similar to the way Morse code converts the letters of a message into a series of dots and dashes that can be represented by the flashing of a signal light. However, keep in mind that "code" in this context simply means converting data from one form to another and has nothing to do with secret codes, security codes, or encryption.

Computers do not use Morse code, but instead use special computer codes that are based on ones (1s) and zeros (0s). For example, a lowercase "y" might be coded as 01111001. Each 1 or 0 is referred to as a **bit** (short for binary digit). Eight bits form a **byte**, the unit of measurement for data storage.

Figure 17-3



The smallest unit of information in a computer is a bit. A bit can be 0 or 1. The electronic circuits in your PC represent a 1 bit as a pulse of electricity.

A series of eight bits is called a byte and typically represents one character. For example, the eight bits shown here represent the letter "y."

Once data has been coded, it is a relatively easy task to convert the 1s and 0s into a form that can be stored or transmitted electronically. When data is stored in memory, a 1 is represented by the presence of an electrical charge in a miniature electronic circuit; a 0 is represented by the absence of a charge. On a disk, 1s and 0s are represented by metallic particles with different magnetic polarities. On a CD, 1s and 0s are represented by nonreflective pits and reflective surfaces called lands. When data is transmitted to printers or display devices, the 1s and 0s might be represented by different voltages.

As data is gathered, processed, stored, and transmitted, it is constantly converted from one type of signal to another. Special **controller chips** that convert data are found on the system board, graphics card, sound card, and modem of your PC. For example, a controller chip on the system board converts each key that you press on the keyboard into a corresponding electronic code.

FAQ Does a computer use the same code for all types of data?

Computers use different codes for different types of data. The codes used for text differ from those used for graphics. The coding method for graphics differs from that used for sound.

ASCII (American Standard Code for Information Interchange) was one of the original codes for representing computer-based text data, such as letters, numerals, and symbols. Codes used in today’s computers, such as extended ASCII and Unicode, are based on ASCII.

Numbers for calculations are usually coded using the binary number system. Computers code bitmap image data using a binary color code for each dot in the image. Data for digital audio is coded using a binary number to represent the height of each wave sample.

Although many methods for coding computer data exist, all of the computer codes that your PC uses share certain characteristics:

- **Digital.** A digit is a single character in a numbering system. To say a code is digital means that it converts data into a finite set of numbers, rather than an infinite set of analog values.
- **Binary.** The binary number system uses only two digits: 0 and 1. Binary coding allows computers to represent all kinds of complex graphical, sound, text, and numeric data using two simple signals, such as “off” and “on.”
- **Fixed length.** The length of a computer code is measured by the number of 1s and 0s required to represent each data item. Codes that are fixed length use the same number of bits to represent each data item. For example, if the code represents the letter “A” using a string of eight bits, it represents a “B” and every other letter of the alphabet using the same number of bits.

By looking at the table of ASCII codes in Figure 17-4, you can see that the underlying code is digital, binary, and fixed length. Just for fun, try writing your name in ASCII code.

Figure 17-4

0	00110000	C	01000011	V	01010110	i	01101001
1	00110001	D	01000100	W	01010111	j	01101010
2	00110010	E	01000101	X	01011000	k	01101011
3	00110011	F	01000110	Y	01011001	l	01101100
4	00110100	G	01000111	Z	01011010	m	01101101
5	00110101	H	01001000	[	01011011	n	01101110
6	00110110	I	01001001	\	01011100	o	01101111
7	00110111	J	01001010	]	01011101	p	01110000
8	00111000	K	01001011	^	01011110	q	01110001
9	00111001	L	01001100	_	01011111	r	01110010
:	00111010	M	01001101	`	01100000	s	01110011
;	00111011	N	01001110	a	01100001	t	01110100
<	00111100	O	01001111	b	01100010	u	01110101
=	00111101	P	01010000	c	01100011	v	01110110
>	00111110	Q	01010001	d	01100100	w	01110111
?	00111111	R	01010010	e	01100101	x	01111000
@	01000000	S	01010011	f	01100110	y	01111001
A	01000001	T	01010100	g	01100111	z	01111010
B	01000010	U	01010101	h	01101000		

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FAQ How does software tie into chips, codes, and circuits?

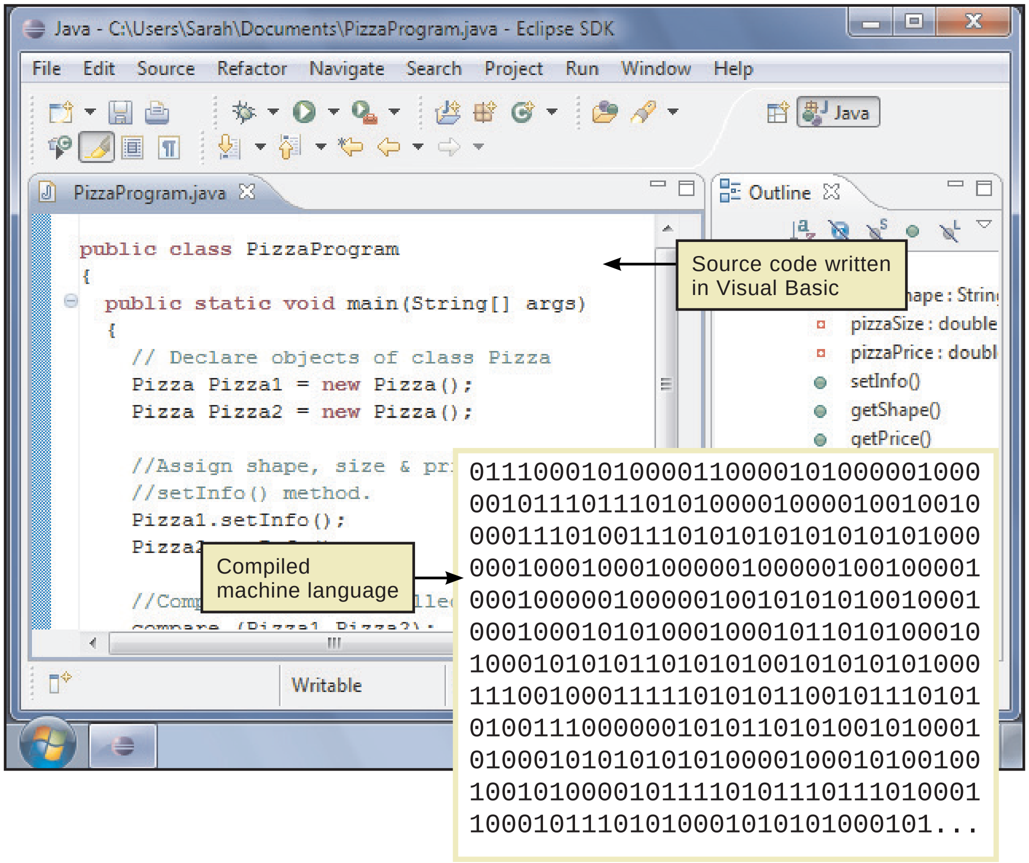
Think back to the concept that instructions in RAM tell the microprocessor how to manipulate data. These instructions come from operating system software and application software. Software is simply a collection of one or more computer programs or "program modules" containing a list of instructions designed to help you and your PC accomplish a task. These instructions are written using a computer **programming language**, such as REALbasic, Visual Basic, PHP, Go, Java, or C++.

Today's programming languages allow programmers to use English-like words and syntax to write instructions for a program module. However, these English-like instructions must be converted into **machine language** before they can be executed within a microprocessor chip. Machine language instructions are coded in 1s and 0s in a form that can be directly executed by a microprocessor.

The process of converting a programmer's English-like instructions into machine language instructions is called **compiling**. Compiling creates executable EXE files, which are stored on disk as software applications. When you want to use a software application program, your PC copies the EXE file instructions from disk into memory. Once in memory, these instructions direct the activities that take place in memory and the microprocessor.

Compiled programs cannot be easily decompiled to produce the original source code. Most software is distributed in compiled format, which deters copycats from converting it back into source code and modifying it to sell knock-off versions. Figure 17-5 illustrates the difference between source code and compiled machine language.

Figure 17-5



```
public class PizzaProgram
{
 public static void main(String[] args)
 {
  // Declare objects of class Pizza
  Pizza Pizza1 = new Pizza();
  Pizza Pizza2 = new Pizza();

  //Assign shape, size & pr
  //setInfo() method.
  Pizza1.setInfo();
  Pizza2

  //Comp                    llec
```

Source code written in Visual Basic

Compiled machine language

```
0111000101000011000001010000010000
0010111011101010000100000100100010
0001110100111010101010101010101000
0001000100010000010000001001000001
0001000000100000100101010100010001
0001000101010001000101101010001000
1000101010110101010010101010101000
1110010001111101010110010111010101
0100111000000101011010100101000100
0100010101010101000010001010010000
1001010000101111010111011101000100
1000101110101000101010101000101...
```

Hardware

Microprocessors

A microprocessor is an integrated circuit that is the main processing device in your PC. The type of microprocessor that's inside a computer indicates its age, dictates the types of programs it can run, affects how fast it can perform computing tasks, and relates to the amount of power it uses.

Some low-power "mobile" chips are designed for portable devices, such as netbook computers, enabling them to run longer on battery power. Chips for desktop computers can blaze away at higher speeds, but typically consume more power.

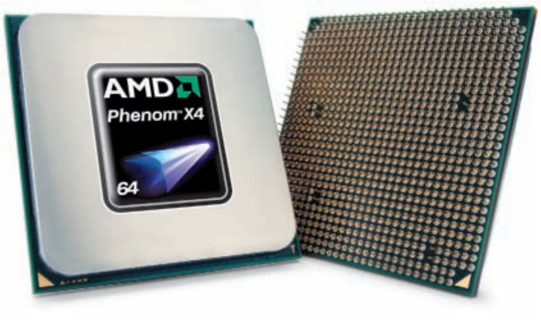
Chipmakers have produced many microprocessor models. Historically, the first PCs contained Intel 8088 and 8086 processors. That was back in 1981. New chips come out every few years and can be used as a fairly accurate indicator of a computer's age.

Most of today's popular computers contain x86 microprocessors. The term **x86** refers to a set of machine language instructions used by Intel 8086 chips. An x86 microprocessor is able to work with the x86 instruction set, a factor that offers compatibility with most of the software written back to the first generation of PCs.

Figure 17-6

intel
Core™ i7

Figure 17-7



Manufacturers of x86 microprocessors include Intel and AMD. Intel is the original x86 chipmaker and still the largest. Its current flagship chip is the Intel Core i7 processor (Figure 17-6). AMD's chip offerings include the Phenom model (Figure 17-7).

Computer ads typically hype a processor's clock speed, which is one of several factors that contribute to overall system performance. **Clock speed** is measured in **gigahertz** (GHz). One GHz is 1 billion cycles per second. Larger GHz numbers indicate faster clock speeds. For example, a 3 GHz clock speed is faster than a 2.4 GHz clock speed.

Clock speed is analogous to how fast you pedal when you ride a bike. Usually, the faster you pedal, the faster you move. During each clock cycle, the processor executes instructions. The faster the clock speed, the more instructions your microprocessor can carry out in each second. If a 2.4 GHz processor executes one instruction for each clock cycle, it performs 2.4 billion instructions per second!

Clock speed is not the only factor that affects processor performance and it is becoming a much less important indicator of microprocessor performance than it was in the past. For example, two microprocessors could both be rated at 2.4 GHz. However, one processor might deliver only three-fourths the performance. What could account for this difference?

Hardware
(continued)

Think again about the bike analogy. Your speed depends not just on how fast you pedal, but also on other factors related to the design of your bike, such as gearing and tire size. For example, if your bike allows you to gear down, you can pedal more slowly, but still maintain your speed. If you have a bicycle built for two, you can go faster with less effort. Likewise, several factors related to the design of a microprocessor can affect the speed at which it processes instructions:

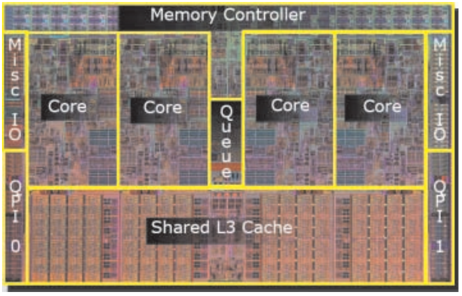
Instructions per clock cycle. Suppose that during each clock cycle, a processor could perform three instructions, instead of one. It would perform three times as much work in the same amount of time. Processors that execute multiple instructions per clock cycle are referred to as **superscalar**.

CPU cache. Before processing can take place, data and instructions exist in RAM chips located several inches away from the processor on the system board of your PC. Even traveling at the speed of light, data can require several clock cycles to move from RAM to the processor. A **CPU cache** (pronounced "cash") is data-holding circuitry from which instructions and data can be accessed faster than from RAM. Typically, cache is measured by its storage capacity in kilobytes (KB) and by the number of cache areas or levels. Most of today's microprocessors have multi-level caches, so you might see references to L1 (Level 1), L2, or L3 caches in advertising materials.

Accelerated front side bus. The circuitry that transports data to the microprocessor is called the **front side bus** (FSB). A fast front side bus moves data quickly and allows the processor to work at full capacity. Processor manufacturers use a variety of techniques, such as HyperTransport and QuickPath, to accelerate the rate at which data travels to the processor.

Extended instruction sets. All x86 processors have a core set of instructions. However, some processors have extended instruction sets that speed up certain types of processing, such as video or photo processing.

Figure 17-8



Multi-core architecture. A **multi-core processor** is a single microprocessor chip with circuitry that allows it to process more than one instruction at a time. For example, the Intel Core i7 chip in Figure 17-8 contains four processing "cores," which theoretically allow the i7 to process instructions four times as fast as a single core processor. In practice, however, a multi-core processor offers maximum performance only when your computer's operating system and application software are optimized for multi-core processing. Windows 7 supports multi-core processing, as do some games and graphics software.

Word size. Microprocessors work with instructions and data composed of bits. **Word size** refers to the number of bits that a microprocessor can manipulate at one time. Word size is based on the size of registers in the processor and the capacity of circuits that lead to those registers. Today's personal computers typically contain **64-bit processors** that have 64-bit registers and process 64 bits at a time. A few **32-bit processors** are still in use, primarily for netbook computers. Processors with a larger word size can process more data during each processor cycle—a factor that leads to increased performance.

Hardware

(continued)

If clock speed doesn’t tell you the whole story about processor performance, how can you gauge the performance of this key computer component? Rather than relying on clock speed ratings, you can get a better picture of processor performance from the results of benchmark tests. A **benchmark test** is a set of standard processing tasks that measure the performance of computer hardware or software.

Microprocessor benchmark tests measure the speed at which a processor performs a set of tasks. Computer manufacturers and independent test labs publish the results of benchmark tests in computer magazines and on Web sites. If you’re interested in finding out how your own PC stacks up, you can download benchmark testing software from the Web.

Many benchmark tests are available today, and each measures a slightly different aspect of processor performance. To make sense of the results, it is useful to have some idea about how a test relates to what your computer does in real life. For convenience, you can group processor benchmark tests into three categories:

- **Multimedia benchmarks** measure processor performance when processing graphics, video, digitized sound, and other multimedia data.
- **Integer benchmarks** measure processing efficiency for integer data, which includes the words and numbers that you manipulate when using spreadsheet, word processing, presentation, and database applications.
- **Floating-point benchmarks** measure processor performance for numbers stored in “floating-point” format that includes decimal places. Good floating-point performance is required for 3D graphics, computer-aided design, and many computer games.

Although processor performance is important, it is only one factor that affects overall PC performance. Your computer is only as fast as its slowest component. Just as you can pedal fast on an icy road but not make much headway, a processor can spin its wheels while it waits for data from a slow disk drive or Internet connection. Getting an overall picture of your computer’s performance requires more than processor benchmarks.

System performance benchmarks measure how well a computer executes a predefined set of tasks while running word processing, spreadsheet, and other productivity software. Using a system benchmark such as PassMark, you can measure and compare the overall performance of your computer. As shown in Figure 17-9, higher overall scores mean faster performance.

Figure 17-9

Overall Score	Computer	Processor	OS	Memory
6258.85	Dell Studio XPS	Intel Core i7 920 2.67 GHz	Windows 7	6 GB
4404.25	HP Pavilion	Intel Core 2 Extreme 3.20 GHz	Windows 7	8 GB
5672.66	Compaq Pro	AMD Phenom II X4 3.4 GHz	Windows 7	6 GB

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Project

Find the technical specifications for your PC

Which processor is in your PC? How fast is it? How much RAM is installed on your PC's system board? The type, capacity, and speed of various components in your PC are called **system specifications**. These specifications are important when you purchase software, upgrade components in your PC, or seek technical support. You can view basic information about your system—such as the manufacturer, the model, and the operating system—by accessing System Properties. You can also access basic performance benchmarks for your computer. To see how efficiently your processor and RAM are performing, you can use the Windows Task Manager. System Information provides access to a complete list of system specifications.

When you have completed the project, you should be able to:

- Use the Control Panel's System application to access basic information about your computer.
- Discover your computer's Windows Experience Index score.
- Use the Task Manager to monitor CPU and RAM activity.
- Access Windows System Information.
- Create a document containing all the technical information about your PC.

Requirements: This project requires Microsoft Windows 7, word processing software, and Paint.

Deliverables:

1 A document containing the following:
    a. A list of your computer's brand, model, processor, RAM capacity, operating system, and system type
    b. A paragraph discussing your computer's Windows Experience Index score
    c. A screen capture showing CPU and RAM activity
2 A file containing your computer's system information

1. The Control Panel's System application displays basic information about your computer. To access this application, click the Start button, click the Computer button, and then select *System properties* from the toolbar. Use word processing software to record your computer's manufacturer, model, operating system, processor specifications, RAM capacity, and system type.

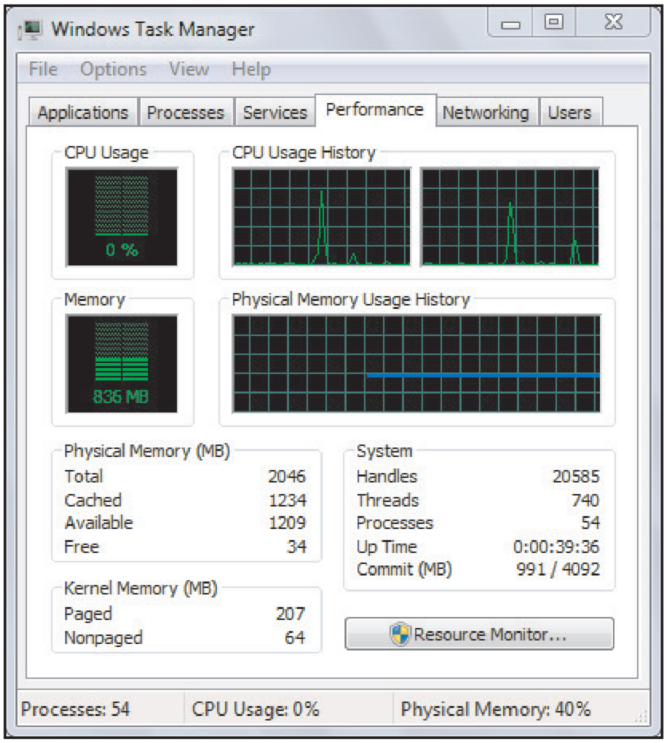
2. Next, record the score listed as your computer's rating. To find out what this score means, click the Windows Experience Index link. Record each of the components and your computer's subscore for each.

3. Click the link to *What do these numbers mean?* and read the information displayed. Add a paragraph to your document that discusses how your computer compares to others based on its performance strengths and weaknesses. Save your document, but leave it open. Close the Help window and the window showing your computer's Windows Experience Index.

• Find the technical specifications for your PC (continued)

4. You can use the Task Manager to monitor CPU and RAM activity to see how busy your computer becomes when performing various tasks. Click the Start button and enter **Task** in the Search box. Click the *View running processes with Task Manager* link. Select the Performance tab. Next, click the Options menu and make sure that a checkmark appears next to *Always on Top* so that this window remains visible. Watch the graph for a few moments; if your computer is idle, the line representing CPU and memory usage should flatline.

5. Now open your browser and watch for changes in CPU and memory usage. Take a screen capture and paste it directly into your word processing document. Adjust the size so it fits on the page. Save your document and close it. Also, close your browser and the Task Manager.



Physical Memory (MB)	
Total	2046
Cached	1234
Available	1209
Free	34

Kernel Memory (MB)	
Paged	207
Nonpaged	64

System	
Handles	20585
Threads	740
Processes	54
Up Time	0:00:39:36
Commit (MB)	991 / 4092

Processes: 54 CPU Usage: 0% Physical Memory: 40%

6. System Information provides a detailed list of your system’s hardware and corresponding software components. Open System Information using the Start menu’s Search box. The System Summary lists several of the same specifications that you accessed in Step 1, but there is much more information here that you can access.

7. In System Information’s left pane are three categories: Hardware Resources, Components, and Software Environment. Click the plus signs to expand each one so that you become familiar with the kind of information provided.

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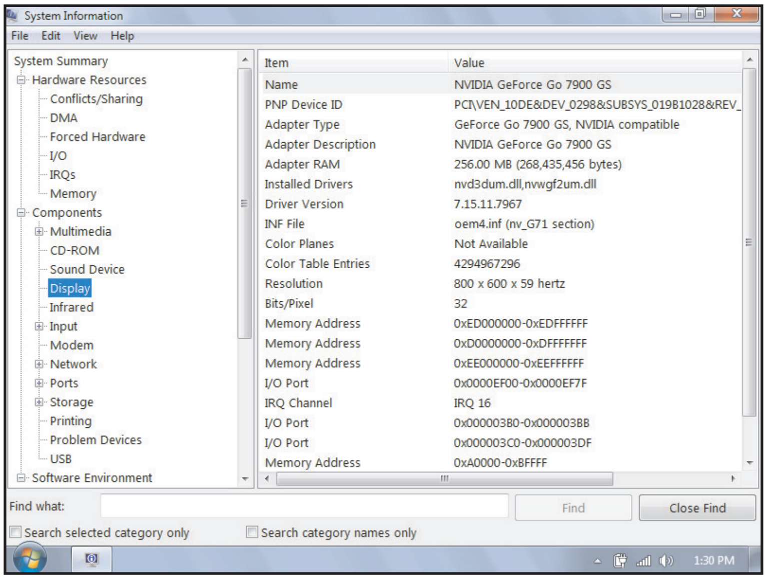
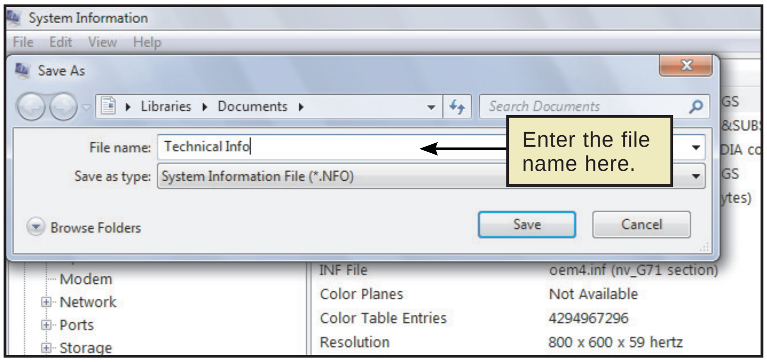
• Find the technical specifications for your PC (continued)

8. Suppose you're having problems with your PC's display adapter or graphics card. To obtain detailed information about it, click Display. General data, such as the name, the adapter type, and the installed drivers, is displayed. Memory addresses and I/O ports—which can be useful for a technical support person helping you—are also included. Your screen should look similar to the example below.


System Information
File Edit View Help
System Summary
Hardware Resources
Conflicts/Sharing
DMA
Forced Hardware
I/O
IRQs
Memory
Components
Multimedia
CD-ROM
Sound Device
Display
Infrared
Input
Modem
Network
Ports
Storage
Printing
Problem Devices
USB
Software Environment
Find what:
Find
Close Find
☐ Search selected category only
☐ Search category names only
1:30 PM

Item	Value
Name	NVIDIA GeForce Go 7900 GS
PNP Device ID	PCI\VEN_10DE&DEV_0298&SUBSYS_019B1028&REV_
Adapter Type	GeForce Go 7900 GS, NVIDIA compatible
Adapter Description	NVIDIA GeForce Go 7900 GS
Adapter RAM	256.00 MB (268,435,456 bytes)
Installed Drivers	nvd3dum.dll,nvwgf2um.dll
Driver Version	7.15.11.7967
INF File	oem4.inf (nv_G71 section)
Color Planes	Not Available
Color Table Entries	4294967296
Resolution	800 x 600 x 59 hertz
Bits/Pixel	32
Memory Address	0xED000000-0xEDFFFFFF
Memory Address	0xD0000000-0xDFFFFFFF
Memory Address	0xEE000000-0xEEFFFFFF
I/O Port	0x0000EF00-0x0000EF7F
IRQ Channel	IRQ 16
I/O Port	0x000003B0-0x000003BB
I/O Port	0x000003C0-0x000003DF
Memory Address	0xA0000-0xBFFFF

9. It's possible to create a document containing all your PC's technical information, which might be requested when you contact technical support. Click the File menu, select Save, name the file **Technical Info [Your Name]** as shown below, and save it.


System Information
File Edit View Help
Save As
Libraries ▸ Documents ▸
Search Documents
Browse Folders
Save
Cancel
Modem
Network
Ports
Storage

File name: Technical Info

Save as type: System Information File (*.NFO)

Enter the file name here.

INF File	oem4.inf (nv_G71 section)
Color Planes	Not Available
Color Table Entries	4294967296
Resolution	800 x 600 x 59 hertz

10. The process of accumulating the technical data takes a while. An NFO file is created and saved in your My Documents folder. If your word processor is Microsoft Office Word, you can view the NFO file. Open Microsoft Word, click the File tab, and select Open. In the lower-right corner, click the down-arrow button to select *All files* for the file type. Double-click Technical Info. The file is opened and identified as an XML document. After you view the technical data, close Microsoft Word.

11. System Information also provides a quick search facility. At the bottom of the window, enter **IP address** in the *Find what* box. Press the Enter key or click the Find button. Scroll down until you can see your active connection and IP address. Close the System Information window to complete the project.

Issue

Who invented the first electronic digital computer?

In a 1973 lawsuit, a computer manufacturing company called Sperry Rand claimed to hold a patent on the technology for electronic digital computers. If the courts upheld this claim, then no company would have been able to manufacture computers without obtaining a license from and paying royalties to Sperry Rand.

Historically, the first inventor to produce a binary digital computer was probably Konrad Zuse, an engineer in Germany who, in 1938, completed work on a computer called the Z1. World War II made collaboration on technology projects difficult, so Zuse’s work was not widely known until after the war. More significantly, Zuse did not file for a U.S. patent. About the same time that Zuse was building the Z1, John Mauchly and J. Presper Eckert began work in Pennsylvania on a computer called the ENIAC, which became operational in 1946. Mauchly and Eckert obtained a patent for digital computer technology and then formed a computer company. Their company and patent were eventually acquired by Sperry Rand.

At the time of the 1973 lawsuit, Sperry Rand appeared to have a clear claim on digital computer technology. However, a seemingly insignificant meeting dating back to 1941 between Mauchly and a mathematician named John Atanasoff had far-reaching consequences on the Sperry Rand patent case. In this meeting and in subsequent correspondence, Atanasoff shared his ideas on computer design with Mauchly. Atanasoff had been constructing a computer of his own, but had never filed for a patent. Mauchly and Eckert subsequently incorporated several of Atanasoff’s ideas to build the ENIAC computer.

When these events became known during the 1973 patent dispute, the judge ruled that “Eckert and Mauchly did not themselves first invent the automatic electronic digital computer, but instead derived that subject matter from one Dr. John Vincent Atanasoff.” The Sperry Rand patent was declared invalid.

What do you think?

1. Does it appear to you that the judge made the right decision, despite the fact that Atanasoff never filed for a patent? ○ Yes ○ No ○ Not sure

2. Do you think that Zuse, instead of Atanasoff, should be declared the inventor of the first electronic digital computer? ○ Yes ○ No ○ Not sure

3. Do you think that the computer industry would be different today if Sperry Rand had won its patent case? ○ Yes ○ No ○ Not sure

Save It!

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QuickCheck A

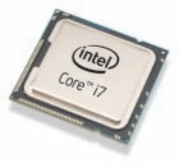
1. A computer accepts input, produces output, stores data, and ☐ data.
2. An integrated ☐ is housed inside a chip carrier.
3. True or false? Computer codes are binary because it is a relatively easy task to convert coded 1s and 0s into electronic signals. ☐
4. The process of converting a programmer's English-like instructions into a file containing machine language instructions is called ☐ .
5. True or false? Processors that execute multiple instructions per clock cycle are referred to as multiscalar. ☐

CheckIt!

QuickCheck B

Match the letter of each image to its correct description:

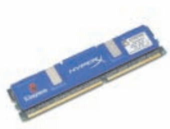
1. A memory module ☐
2. Microprocessor ☐
3. Chip carriers ☐
4. Benchmark ☐
5. ASCII code ☐



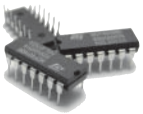
A

01000111

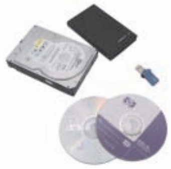
B



C



D



E

Passmark 6250.12

F

CheckIt!

GetIt? While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 17.

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CHAPTER 18

Buying a PC

What's Inside?

Whether you're purchasing your first computer or buying a replacement, Chapter 18 provides a generous collection of practical tips to help you select a dependable computer from a reliable merchant at a reasonable price. You'll learn a simple but effective shopping strategy that's tailored to today's computer marketplace.

- **FAQs:**

  - So many options—where do I begin? 257
  - Where can I find prices and specifications? 258
  - How much computing power do I need? 259
  - Where can I find the best deal? 260
  - Is it okay to mail order a PC? 261
- **Hardware:** Green gear 262
- **Project:** Explore online computer stores 265
- **Issue:** Who pays for e-waste? 268
- **QuickChecks** 269

What's on the CD?

Getting a good deal on a computer system requires a little bit of research and comparative shopping. Don't be afraid to ask questions as you shop. A video in Chapter 18 provides tips on how to order a computer by phone. In the project for this chapter, you'll also learn how to navigate the Web to expertly compare prices and place orders.

- Eavesdrop on an experienced shopper ordering a computer by phone 261
- Quiz yourself with interactive QuickChecks and Get It? questions 269

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FAQ So many options—where do I begin?

When shopping for a computer, you want to make sure you get a good deal. However, finding that good deal seems to require a certain level of technical know-how. What if you make a mistake because you don't understand the computer specifications?

You can be happy with a computer purchase if you pay a reasonable price to a reliable merchant for a dependable computer. You don't need to find the absolute lowest price. Spending days to track down a savings of US $20 wastes time that you could more profitably spend at your new computer. Follow these steps to replicate the successful shopping strategy of experienced computer buyers:

1. Choose a platform.
2. Decide whether you want a notebook, netbook, or desktop computer.
3. Browse through computer magazines, computer catalogs, and Web sites to get an idea of current prices and features.
4. Make your final selection by comparing prices, features, availability of technical support, and warranty coverage.

Your first step is to choose a platform. A **computer platform** is simply a category or family of computers. Two platforms currently compete for consumer dollars: the PC platform and the Mac platform. The PC platform includes popular brands such as Dell, Hewlett-Packard, Compaq, Lenovo, and Acer, designed to run Windows. More than 90% of computer buyers select the PC platform. The Mac platform includes all of the Macintosh desktop and notebook computers manufactured by Apple.

Today's Macs are sometimes referred to as Intel Macs because they use the same microprocessors as PCs. Software tools, such as Apple Boot Camp and Parallels Desktop for Mac, allow you to run the Windows operating system and Windows application software on a Mac. If you like the style of the Mac but need some of the software available for PCs, consider purchasing a Mac and adding PC functionality with Parallels or Boot Camp.

After selecting a platform, you should decide whether you would like a desktop, notebook, or netbook computer. Obviously, if you need to carry around a computer, you should select a notebook or netbook. Notebooks are heavier but more powerful than netbooks. They also have larger screens and optical drives. Netbooks run much longer on battery power than notebooks and are considerably less expensive. Most consumers who plan to own one computer at a time purchase a notebook.

Would it be reasonable to purchase a notebook computer even if it was destined to spend most of its life on your desk? The answer to this question is different than it was a few years ago, when notebook computers had barely readable screens, limited storage capacity, and no CD or DVD drive. The features of today's notebook computers essentially match those of a desktop, so they are a good choice even if you are not planning to tote your computer about.

The main reason to consider purchasing a desktop computer is expandability. For example, if you are into computer games and plan to keep up with the latest graphics technology, then you might consider a desktop computer so you can get inside the case and swap out components.

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FAQ Where can I find prices and specifications?

Assuming that you've selected a platform and decided whether you want a notebook, netbook, or desktop computer, your next step is browsing the Web to get an idea of current prices and specifications. Contrary to what you might expect, in this shopping phase you're not yet looking for the computer you want to purchase. Instead, you're trying to get a handle on the current market by identifying computer specifications in three price ranges: under US$500, US$500–$1,000, and over US$1,000.

As you look at specifications in each price range, pay particular attention to the (1) microprocessor manufacturer and model, (2) microprocessor speed, (3) RAM capacity, (4) hard disk capacity and speed, (5) display screen size, and (6) amount of video memory. After looking at the specifications for a few computers, a pattern will emerge; specifications in each price range tend to be similar. You can create your own price-range table like the one in Figure 18-1 and fill it in with the results of your research. However, you should be aware that such a table will remain valid for only a few months because computer prices and features are constantly changing.

Figure 18-1

Specification	Under US$500	US$500–US$1,000	Above US$1,000
Microprocessor	Intel Celeron or Pentium Dual Core	Intel or AMD Dual Core	Intel or AMD Quad Core
Processor speed	1.66–2.2 GHz	2.2–3.0 GHz	2.4–3.6 GHz
RAM capacity	2–4 GB	2–6 GB	4–8 GB
Hard disk capacity and speed	160–250 GB 5400 rpm	320–500 GB 5400 or 7200 rpm	500 GB–2 TB 7200 rpm
Display screen size	15"	16–17"	16–17"
Video type and memory	Integrated/shared 256 MB	Integrated/shared 256–512 MB	Integrated or discrete 512 MB–1 GB

You'll find that system specifications are similar in each price range, regardless of the merchant. Once you recognize these specifications, you can be assured of getting a reasonable deal. Be wary of any computer that doesn't meet the specifications for the price range—it could be overpriced.

Some additional factors can affect the price of a computer and make it seem overpriced. A notable example is the thickness or weight of a notebook computer. Very thin and very lightweight computers have premium price tags that make them more expensive than computers with similar processor, memory, and storage specifications. Some computers include bundled software, and you can factor that into your research, but read the fine print. Some bundled software is actually demoware that you'll have to pay for if you want to continue to use it past the trial period.

To find information on current prices and specifications, you can look at the ads in computer magazines and at online retailers. Print and Web versions of computer magazines, such as *Computer Shopper*, *PC Magazine*, and *PC World*, contain ads and reviews. You can also check pricing at computer manufacturer's sites, such as Dell (www.dell.com), Hewlett-Packard (www.hp.com), and Lenovo (www.lenovo.com). Popular online retailers include Computer Discount Warehouse (www.cdw.com), PC Connection (www.pcconnection.com), Best Buy (www.bestbuy.com), and Walmart (www.walmart.com).

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FAQ How much computing power do I need?

After you have completed your price-range research, it is time to decide how much computing power you need and can afford. Starting at the top, a PC priced higher than US$1,000 is the computer equivalent of a luxury automobile. A computer in this price range contains state-of-the-art components: the latest, greatest Intel microprocessor; the newest, fastest graphics card; and the coolest sound system. You can also expect a generous amount of RAM and a copious amount of disk storage space. A top-of-the-line PC runs the newest versions of the operating system and application software with ease, and typically works with older versions as well. Because such a computer contains state-of-the-art components, you're not likely to replace it as quickly as a less expensive computer.

Computers that retail for between US$500 and US$1,000 might be considered the four-door sedans of the computer marketplace because the majority of buyers select a PC in this price range. These popular PCs lack the flashy specifications of their state-of-the-art cousins, but provide ample computing power to run current versions of the operating system and application software.

In the computer industry, the equivalent of a compact car is a sub-US$500 PC. Some netbooks and budget PCs cost as little as US$250. The technology in budget PCs is usually a few years old and you can expect reduced processor speed, memory capacity, and drive capacity. Nevertheless, budget PCs are equivalent to state-of-the-art PCs that people were perfectly happy with just a few years ago. Barring any drastic change in the operating system or application software, you can expect current software to perform adequately on a sub-US$500 PC. However, you might need to replace a budget PC sooner than a more expensive model.

If you're on a budget, you might consider buying a used car. Should you also consider a used computer? The answer is yes if the specifications for the used computer at least match those you've listed for sub-US$500 PCs in your price-range table. You should be able to negotiate a price that is approximately half of what you would pay for a new computer with similar specifications. You are not likely to get a warranty with a used PC, so make sure that it works before you buy it.

Once you decide on a price range, you can use the checklist in Figure 18-2 to compare specific brands and models.

Figure 18-2

Manufacturer:
Model:
Price:
Processor model:
Processor speed:
CPU cache:
RAM capacity:
Hard drive capacity:
CD/DVD drive type:
Network card:
Modem:
Sound card type:
Speaker description:
Graphics card type:
Graphics card RAM:
Display type (LCD, LED):
Display screen size and max. resolution:
Type of pointing device:
Number of USB ports:
Graphics ports:
Operating system:
Bundled software (list):
Warranty coverage:
Technical support quality:

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FAQ Where can I find the best deal?

You can purchase a PC from a computer superstore, mass-market merchant, or online retailer. By understanding the advantages and disadvantages associated with each of these shopping outlets, you can better evaluate the deals that they offer.

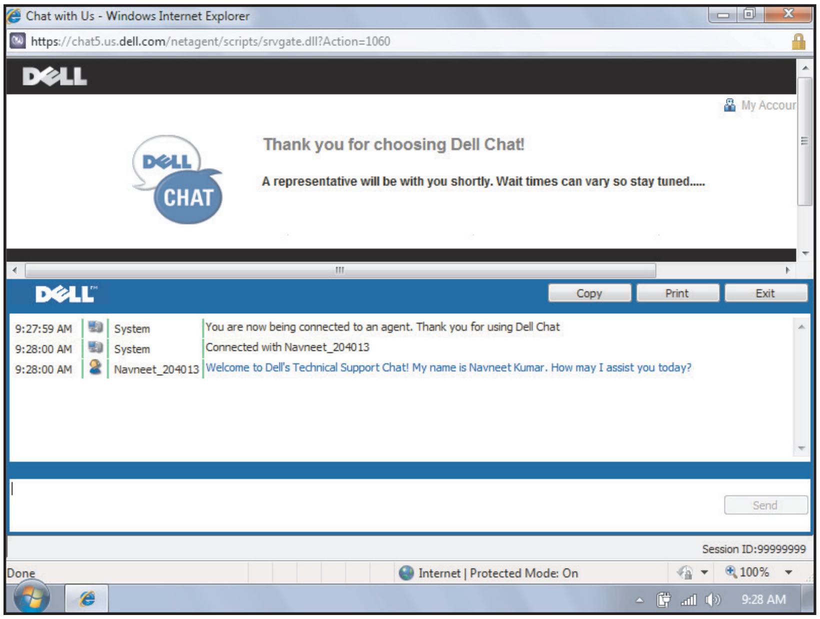
When shopping for a computer in a conventional store, you can “kick the tires” by comparing the speed and response of PCs with different microprocessors, trying out keyboards and pointing devices, and examining the image quality of different displays. Computers are sold in a variety of stores, including huge computer superstores such as CompUSA, where you’ll see a staggering array of products at great prices. The sales staff is trained to help you select a computer to meet your needs and budget, but you might have to pay for after-purchase technical support.

If you don’t live close to a computer superstore, check local office superstores, such as Staples, Office Depot, and OfficeMax, as well as mass-market stores, such as Walmart, Best Buy, and Sears. The sales staff in these stores might not have an extensive computer background, so you could be on your own as far as your selection goes. These stores rarely offer after-purchase technical support, instead directing you to the computer manufacturer’s toll-free support line.

Some computer manufacturers sell computers directly to customers. With this manufacturer direct sales option, you can place your order over the phone or at a Web site. Most manufacturers offer a range of models. You can purchase a standard configuration, or you can have a computer customized with more RAM, a faster processor, a better graphics card, and so on. Companies that provide direct sales include Dell, HP, and Gateway.

When you buy direct from a reputable manufacturer, you can expect good pricing and the flexibility of having a computer made to order. One disadvantage of buying direct is that you can’t typically try the computer before you buy it. Also, local technical support might not be available. Instead, you must contact the manufacturer’s technical support center by phone or access its Web site. Online technical support has become quite sophisticated. You can chat with a technician, who can access your computer remotely to run diagnostic tests and fix a variety of problems.

Figure 18-3


Chat with Us - Windows Internet Explorer
https://chat5.us.dell.com/netagent/scripts/srvgate.dll?Action=1060
DELL
My Accour
DELL CHAT
DELL
Copy
Print
Exit
Send
Session ID:99999999
Done
Internet | Protected Mode: On
100%
9:28 AM

Thank you for choosing Dell Chat!

A representative will be with you shortly. Wait times can vary so stay tuned.....

9:27:59 AM	System	You are now being connected to an agent. Thank you for using Dell Chat
9:28:00 AM	System	Connected with Navneet_204013
9:28:00 AM	Navneet_204013	Welcome to Dell's Technical Support Chat! My name is Navneet Kumar. How may I assist you today?

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FAQ Is it okay to mail order a PC?

Mail order is one of the most popular ways of buying a computer—you either phone in an order or place it at a Web site. Your new computer arrives by mail, which usually means by a courier service, such as FedEx or UPS. The main caution about mail order is to buy from a reputable dealer. When in doubt, check with the Better Business Bureau (www.bbb.org) or, at sites like eBay and Amazon Marketplace, look at the seller rating.

If you're ordering a computer by phone, a salesperson can answer your questions about equipment or warranties, take your order, and provide details about current pricing. Make sure that you obtain the following information related to your order: the salesperson's name, order number, expected ship date, total price (including shipping), and whom to contact if you have questions or problems with the order.

When ordering on the Web, you typically follow prompts on the screen to select a computer, choose custom options, enter your shipping address, and provide your credit card billing information. You receive confirmation of your order by e-mail or regular mail. Review the order confirmation to make sure that it includes all of the items that you ordered, the correct price, and the right shipping address. Hang on to your order confirmation—it contains your order number and tracking information.

Whether you've placed an order by phone or on the Web, your new computer won't fit in your mailbox, so you must make arrangements for someone to be home when your shipment arrives. Otherwise, you can arrange to pick up your packages at the courier's office. Be aware that shipments are occasionally delayed or lost. If your computer does not arrive when promised, immediately contact your vendor to initiate a search for your packages.

No matter where you buy your computer, you should receive a purchase receipt. Keep it handy in case you need it as proof of purchase date for warranty claims. Most computers come with a one-year parts and labor warranty. Read the warranty carefully so that you understand what it covers and exactly which repair services it provides. Many merchants also offer extended warranties—some lasting as long as five years. Depending on the price and coverage, an extended warranty can be an excellent deal. Click the Play It! button to eavesdrop on an experienced shopper who is ordering a computer by phone.

PlayIt!

Figure 18-4

PC WORLD
ULTIMATE PC UPGRADES

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Hardware

Green gear

The goal of green computing is to design, manufacture, use, and dispose of electronic devices in a way that has minimal impact on the environment.

Green design and manufacturing mean producing energy-efficient devices using non-toxic components and environmentally sound manufacturing processes.

Green use aims to reduce the energy consumption of electronic devices.

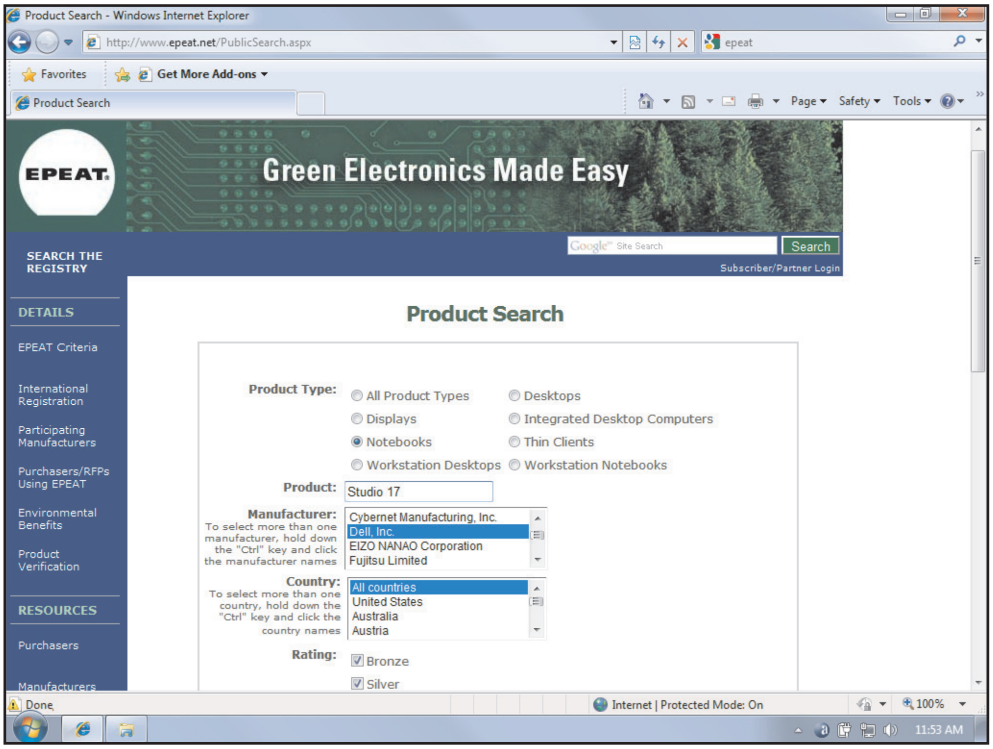
Green disposal includes reuse and recycling of old computers and electronic gear.

Green computing begins with design and manufacturing processes. Computer companies that take a complete life cycle approach to a product's environmental impact can produce products that are energy efficient and recyclable. One of the greatest environmental challenges facing computer manufacturers is avoiding or minimizing the use of environmentally harmful arsenic, brominated flame retardants (BFRs), mercury, phthalates, and polyvinyl chloride (PVC) in circuit boards, cables, connectors, insulators, system cases, and LCD screen backlights.

Government regulations in many countries have encouraged computer manufacturers to look for alternative manufacturing methods and equipment components. Independent industry watchdogs have also provided incentives in the form of ratings, rankings, and endorsements.

EPEAT (Electronic Product Environmental Assessment Tool) is a program sponsored by the Green Electronics Council that rates electronics manufacturers on 51 environmental criteria, including reduced use of environmentally sensitive materials, product longevity, energy efficiency, and end-of-life management. Consumers can use a simple form at the Green Electronics Council's Web site (www.epeat.net/Search.aspx) to find the EPEAT rating for a particular product.

Figure 18-5


Product Search - Windows Internet Explorer
http://www.epeat.net/PublicSearch.aspx
epeat
Favorites
Get More Add-ons
Product Search
Page
Safety
Tools
EPEAT
Green Electronics Made Easy
Google Site Search
Search
Subscriber/Partner Login
SEARCH THE REGISTRY
DETAILS
EPEAT Criteria
International Registration
Participating Manufacturers
Purchasers/RFPs Using EPEAT
Environmental Benefits
Product Verification
RESOURCES
Purchasers
Manufacturers
Done
Internet | Protected Mode: On
100%
11:53 AM

Product Search

Product Type: ○ All Product Types ○ Desktops ○ Displays ○ Integrated Desktop Computers ● Notebooks ○ Thin Clients ○ Workstation Desktops ○ Workstation Notebooks

Product: Studio 17

Manufacturer: To select more than one manufacturer, hold down the "Ctrl" key and click the manufacturer names
Cybernet Manufacturing, Inc.
Dell, Inc. (selected)
EIZO NANAO Corporation
Fujitsu Limited

Country: To select more than one country, hold down the "Ctrl" key and click the country names
All countries (selected)
United States
Australia
Austria

Rating: ☑ Bronze ☑ Silver

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Hardware
(continued)

Consumers cannot directly control the amount of toxic materials used to produce electronic devices, but they have some control over the power consumed while using computers and other digital devices.

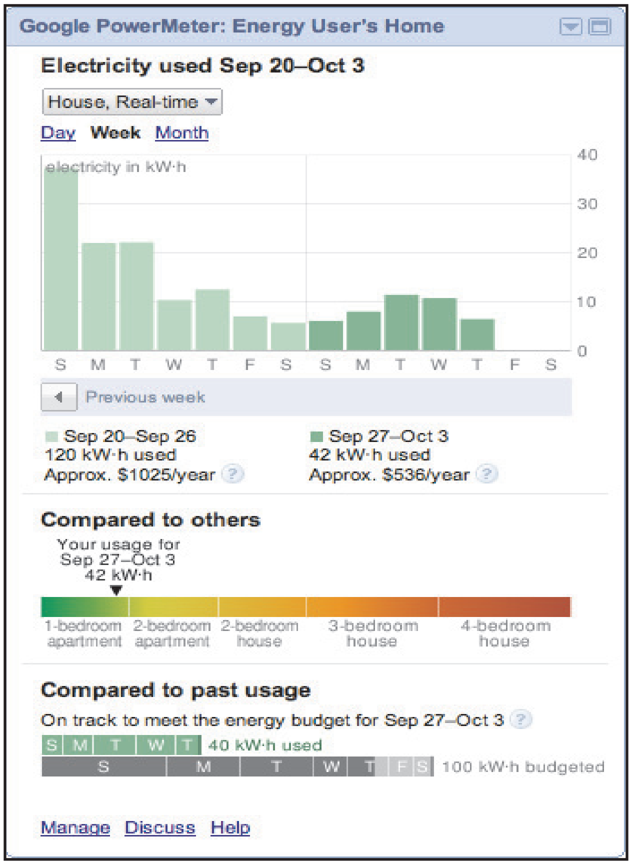
Energy use varies from one computer model to another, and depends on what the computer is doing. When actively running software or displaying videos, a computer is "under load" and is consuming power at close to its maximum rate. When a computer is on and displaying the Windows desktop, but not performing other tasks, it is in idle mode and consuming less power. Computers consume even less power when in sleep mode or turned off. Unfortunately, today's computers and many other electronic devices pull some amount of so-called "phantom power" when off, but plugged in. **Phantom power** (or vampire power) is used to illuminate various LED lights and allow a device to be turned on by remote control. Even unplugged, a notebook computer draws power from its battery, which has to be recharged the next time it is plugged in. An average Dell notebook computer's energy use would be similar to the example in Figure 18-6.

Figure 18-6

Active	Idle	Sleep	Off	Annual
46 watts	13 watts	0.6 watts	0.3 watts	50 kWh

Your power company measures electrical use in kilowatt hours (kWh). A **kilowatt hour** is 1,000 watts of power used for an hour's time. The average U.S. household uses a bit more than 900 kWh per month. Computers and other electronic gear account for about 9% of household energy use.

Figure 18-7



Google PowerMeter: Energy User's Home

Electricity used Sep 20–Oct 3

House, Real-time

Sep 20–Sep 26
120 kW·h used
Approx. $1025/year

Sep 27–Oct 3
42 kW·h used
Approx. $536/year

Compared to others

Your usage for Sep 27–Oct 3
42 kW·h

Compared to past usage

On track to meet the energy budget for Sep 27–Oct 3

40 kW·h used

100 kW·h budgeted

When shopping for household appliances and electronic gear, look for the ENERGY STAR logo. ENERGY STAR products meet stringent standards and are typically 20–30% more energy efficient than required by federal standards.

If you are interested in verifying the energy efficiency of an electronic device, you can use a watt meter or home energy monitor. These devices measure the wattage used by a single device or by an entire household.

Some home energy monitors can share data with Google's PowerMeter application (Figure 18-7), which displays daily, weekly, and monthly energy-use graphs and shows how your energy usage compares to the average.

Hardware

(continued)

In the U.S., where the average lifespan of a computer is two years, 130,000 computers are thrown away every day. Globally, more than 100 million cell phones are disposed of every year. Joined by discarded computers and other electronic devices, the equipment headed to landfills is estimated to be more than 20 million tons per year. According to Greenpeace, if that waste was loaded into containers on a train, it would stretch around the globe. And then there are the batteries that power many of these devices. More than 15 billion are discarded each year—enough to make a column to the moon and back.

Figure 18-8

Much of the gear used for computing can be recycled. Use rechargeable batteries whenever possible and dispose of dead batteries at a designated collection center. You can find a center near you by entering your zip code at www.call2recycle.org.

Consider refilling your printer ink or toner cartridges instead of purchasing new ones. When printer supplies have to be discarded, check the manufacturer's Web site to see if the part can be sent back for recycling.

Old computers can be kept out of landfills by reuse and recycling. Donating a computer to a school or charitable organization extends its useful life, but is only a stopgap measure. Before donating a device, try to find out if the device will be properly recycled at the end of its useful life. If not, you might want to reconsider the donation and instead send the device directly to a recycling center. The computer manufacturer might have a take-back program or your local community might be equipped to recycle electronics.

If you decide to donate old electronics to schools or charity, make sure to delete all your data files using file shredder software to make sure that data cannot be recovered. Sending files to the Recycle Bin is not enough; and even after the Recycle Bin is emptied, it is fairly simple to retrieve the deleted data. File shredder software writes over the sectors of a disk with random data, making it very difficult to recover files. For maximum security, however, consider removing the hard disk entirely. Be aware, however, that many schools and charitable organizations will not accept computers without important components such as the hard disk.

One additional point about donating computers. If you leave software on the hard disk, check the license agreements. Typically, if you intend to continue to use the software on a different computer, you should delete the software from your old machine. You might consider reformatting the hard disk to erase its contents and then using the system recovery disc to return your computer to its factory-new configuration. In general, the original operating system, demoware, and accessory applications can be legally transferred along with computer ownership.

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Project

Explore online computer stores

You can use the Web to access online versions of computer manufacturers' sales outlets, computer superstores, and mass-market merchants. At these Web sites, you can shop at your leisure and without pressure from a salesperson. You can browse through product descriptions and review prices for standard PC packages. At some sites, you can create customized computer systems without committing to a purchase until you submit your credit card billing information.

The Web provides another shopping option. At "price quote" sites, you can enter the brand and model of the PC you'd like to purchase. After a brief search, you'll see a list comparing prices at different online stores. Just be aware that some price quote sites search only those merchants that have paid to participate.

When you have completed the project, you should be able to:

- Purchase a standard computer package from a manufacturer's Web site.
- Select custom options for a standard computer package.
- Purchase a computer from an online store.
- Use a price quote Web site to compare prices for a computer system.

Requirements: This project requires Microsoft Windows 7, word processing software, and a browser.

The deliverable is a document containing the following:

1 Basic descriptions for the most and least expensive Dell notebook computers in the $800–$1,200 price range

2 A list of five major differences resulting from a comparison of three Dell notebook computers

3 The summary of specifications from a custom-configured $1,200 notebook computer

4 Specifications for a $1,200 computer from Best Buy

5 A summary of your findings from Bizrate.com

1. Suppose you're in the market for a computer and you have a budget of US$1,200. Because you consider mobility and portability important, you prefer to look at notebook computers instead of desktops; although as a rule, desktops provide more for the price. You can check out the Web site of a computer manufacturer, such as Dell. Since the time this textbook was published, Dell's Web site design and computer offerings might have changed. Therefore, you might have to slightly diverge from the steps provided, and your search results might not be the same as the examples shown.

2. Open your browser and connect to www.dell.com. Dell's main page is displayed.

3. Use the links on Dell's main page to navigate to information about notebook computers suitable for home and home office applications.

4. On the Laptops/Notebooks page, you can narrow down your choices by selecting the product category, storage capacity, price, screen size, or weight. Suppose you want to be sure you stay close to your budget. Select $800–$1200 under Price.

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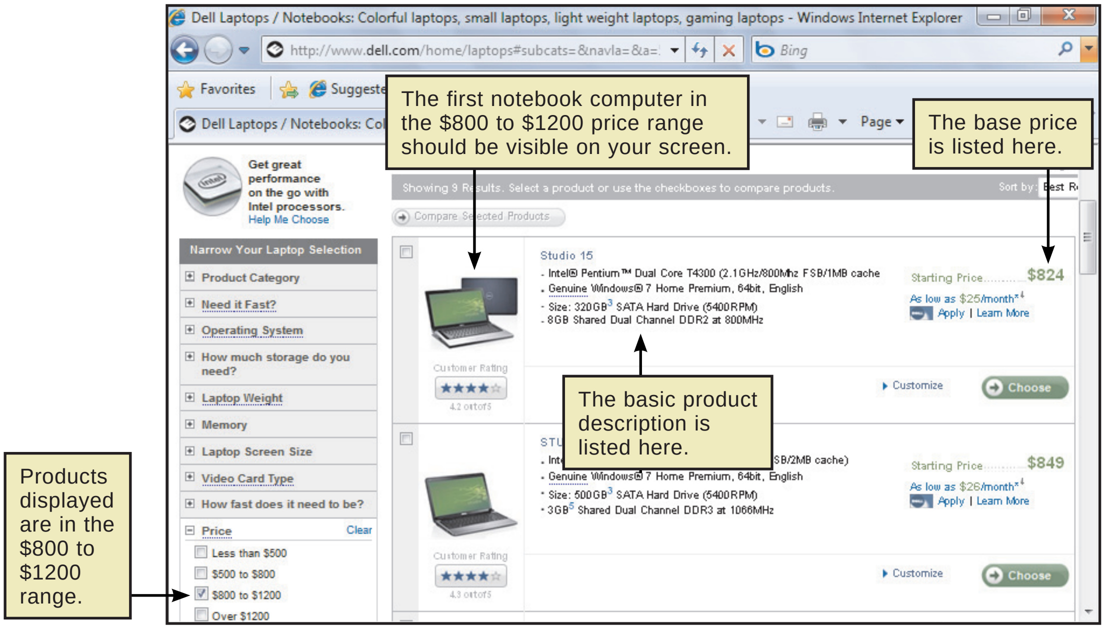
• Explore online computer stores (continued)

5. Products in the specified price range are listed. Note that the list might be more than one page. Open your word processor and record the basic description for the least expensive and the most expensive computers in this price bracket. You can copy and paste much of the information to save time.


Dell Laptops / Notebooks: Colorful laptops, small laptops, light weight laptops, gaming laptops - Windows Internet Explorer
http://www.dell.com/home/laptops#subcats=&navla=&a=
Bing
Favorites
Suggeste
Dell Laptops / Notebooks: Col
Page
Get great performance on the go with Intel processors.
Help Me Choose
Narrow Your Laptop Selection
Product Category
Need it Fast?
Operating System
How much storage do you need?
Laptop Weight
Memory
Laptop Screen Size
Video Card Type
How fast does it need to be?
Price
Clear
☐ Less than $500
☐ $500 to $800
☑ $800 to $1200
☐ Over $1200
Showing 9 Results. Select a product or use the checkboxes to compare products.
Sort by: Best R
Compare Selected Products
Customer Rating
4.2 out of 5
4.3 out of 5
Customize
Choose
Apply | Learn More

Studio 15
- Intel® Pentium™ Dual Core T4300 (2.1GHz/800Mhz FSB/1MB cache
- Genuine Windows® 7 Home Premium, 64bit, English
- Size: 320GB SATA Hard Drive (5400RPM)
- 8GB Shared Dual Channel DDR2 at 800MHz

Starting Price $824
As low as $25/month

STU
- Int ...SB/2MB cache)
- Genuine Windows® 7 Home Premium, 64bit, English
- Size: 500GB SATA Hard Drive (5400RPM)
- 3GB Shared Dual Channel DDR3 at 1066MHz

Starting Price $849
As low as $26/month

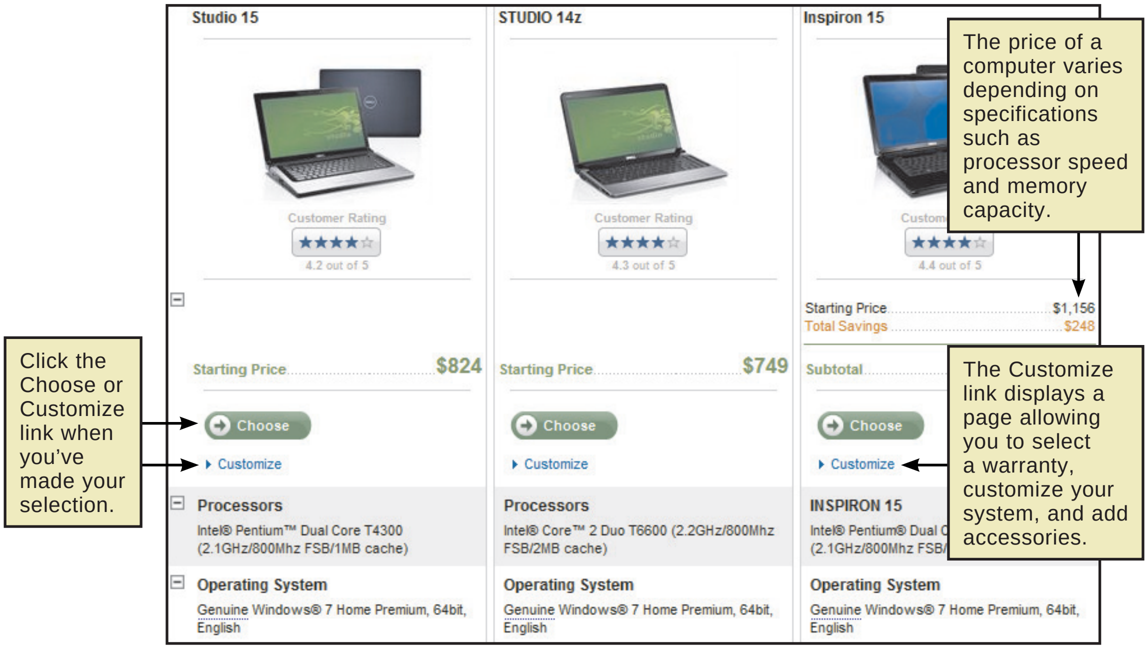
The first notebook computer in the $800 to $1200 price range should be visible on your screen.

The base price is listed here.

The basic product description is listed here.

Products displayed are in the $800 to $1200 range.

6. Dell allows you to compare computers side-by-side. Place checkmarks in the checkboxes for the least expensive, the most expensive, and one other computer, then click the Compare Selected Products button. Record five major differences in the specifications for these computers.


Studio 15
STUDIO 14z
Inspiron 15
Customer Rating
4.2 out of 5
4.3 out of 5
4.4 out of 5
Choose
Customize

Studio 15	STUDIO 14z	Inspiron 15
		Starting Price $1,156 Total Savings $248
Starting Price $824	Starting Price $749	Subtotal
Processors Intel® Pentium™ Dual Core T4300 (2.1GHz/800Mhz FSB/1MB cache)	**Processors** Intel® Core™ 2 Duo T6600 (2.2GHz/800Mhz FSB/2MB cache)	**INSPIRON 15** Intel® Pentium® Dual C (2.1GHz/800Mhz FSB/
Operating System Genuine Windows® 7 Home Premium, 64bit, English	**Operating System** Genuine Windows® 7 Home Premium, 64bit, English	**Operating System** Genuine Windows® 7 Home Premium, 64bit, English

The price of a computer varies depending on specifications such as processor speed and memory capacity.

Click the Choose or Customize link when you've made your selection.

The Customize link displays a page allowing you to select a warranty, customize your system, and add accessories.

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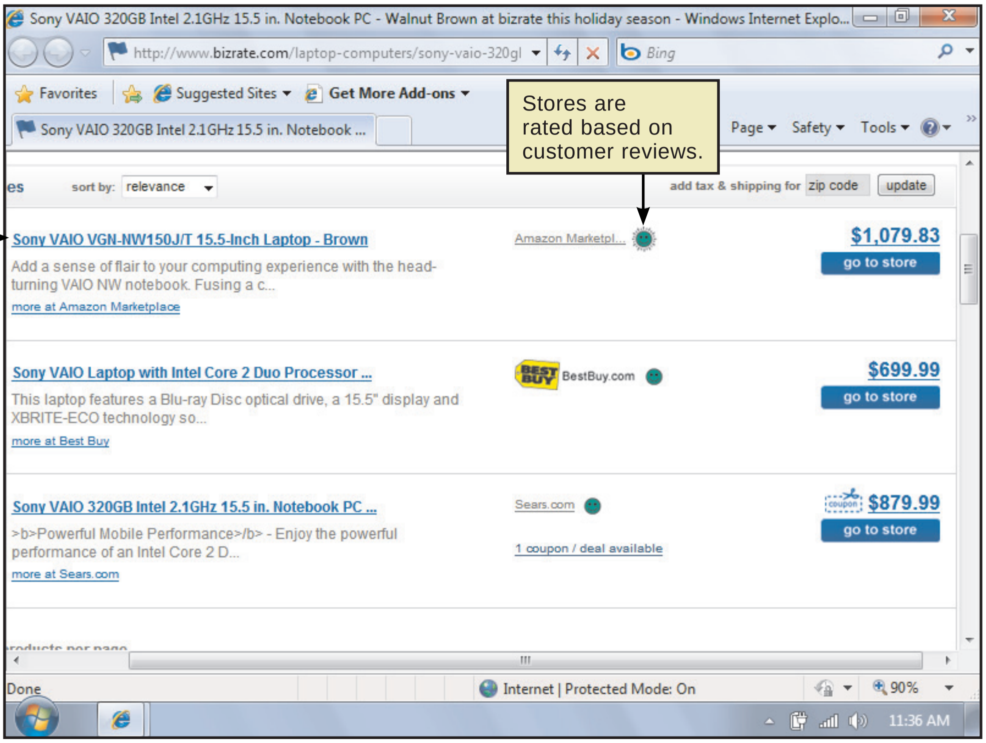
• Explore online computer stores (continued)

7. Click the Choose button for one of the three computers. Click the Customize link and then click SWITCH TO LIST VIEW.

8. Customize your selection until you reach your US$1,200 limit. When you're done customizing, copy the specification summary from the panel on the right side of the screen and then paste it into your word processor. For this project, you will not proceed to Checkout, which requires you to open an account and provide personal and billing information.

9. You can also check out the Web sites of office superstores or mass-market stores to look for bargain prices on computers. In the browser's address bar, enter **www.bestbuy.com**. Search for notebook computers within your price range. Copy the specifications for one of these computers and paste them into your word processor. Highlight any specifications that are better than the Dell computer you selected in previous steps.

10. Suppose you want to be sure that the computer you selected in Step 9 is not being sold elsewhere at a cheaper price. You can do some comparison shopping online by visiting price quote sites, such as Bizrate. Enter **www.bizrate.com** in the address bar. Search for the brand and model of the computer you selected at the Best Buy site. If Bizrate finds the name and model, it will provide either a list of stores selling the computer (similar to the example below) or a list of similar computers. Record the results of your search in your word processor. Save the document containing your work for this project as **Project 18 [Your Name]**. Close all windows.


Sony VAIO 320GB Intel 2.1GHz 15.5 in. Notebook PC - Walnut Brown at bizrate this holiday season - Windows Internet Explo...
http://www.bizrate.com/laptop-computers/sony-vaio-320gl
Bing
Favorites
Suggested Sites
Get More Add-ons
Sony VAIO 320GB Intel 2.1GHz 15.5 in. Notebook ...
Page
Safety
Tools
sort by: relevance
add tax & shipping for zip code
update
Done
Internet | Protected Mode: On
90%
11:36 AM

Sony VAIO VGN-NW150J/T 15.5-Inch Laptop - Brown

Add a sense of flair to your computing experience with the head-turning VAIO NW notebook. Fusing a c...

more at Amazon Marketplace

Amazon Marketpl...

$1,079.83

go to store

Sony VAIO Laptop with Intel Core 2 Duo Processor ...

This laptop features a Blu-ray Disc optical drive, a 15.5" display and XBRITE-ECO technology so...

more at Best Buy

BestBuy.com

$699.99

go to store

Sony VAIO 320GB Intel 2.1GHz 15.5 in. Notebook PC ...

>b>Powerful Mobile Performance>/b> - Enjoy the powerful performance of an Intel Core 2 D...

more at Sears.com

Sears.com

1 coupon / deal available

$879.99

go to store

Bizrate lists the brand and model of computers that match your search criteria.

Stores are rated based on customer reviews.

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Issue

Who pays for e-waste?

Environmentally friendly recycling can be a complex and costly process in which a device is disassembled and its plastics, metals, and glass are separated and safely processed. The expense of environmentally sound disposal has created a corrupt international e-waste market that has alarmed environmentalists and human rights activists.

Computers and electronic devices that consumers deliver to recycling centers are sometimes sold and shipped to scrap dealers in developing countries. There, workers who recover copper and other scrap materials from mountains of e-waste are paid pennies per hour and are not protected from toxic components. When the valuable bits have been removed, the remaining e-waste is openly burned, dumped into rivers, or soaked in acid baths, releasing toxic materials into the air, ground, and water.

Proponents of e-waste transshipping point out that processing e-waste in developing countries provides much needed jobs and offers consumers in developed countries a less costly way to dispose of unwanted gear. The environmental and human costs of unregulated disposal practices have triggered a search for a different solution to e-waste disposal.

Basic to the issue of reducing electronic waste is the question of “Who pays?” Should it be the taxpayer, the individual consumer, the retailer, or the manufacturer? When Californians were faced with the prospect of tax hikes to deal with electronic waste disposal, activists questioned if tax increases were fair to individual taxpayers who generate very little electronic waste. Now, consumers buying computers in California have to pay a recycling fee at the time of purchase.

Some states have adopted laws that require electronics manufacturers to subsidize e-waste disposal or offer take-back services. The economics of take-back programs can increase product costs, however, if manufacturers pass recycling costs through to consumers.

The Environmental Protection Agency (EPA) advocates a national plan in which consumers, retailers, and manufacturers cooperate to reduce electronic waste, suggesting that because recycling laws differ from state to state, consumers are often confused about how to dispose of their unwanted gear. Some consumers worry that such a plan would lead to additional federal bureaucracy and costs that raise taxes.

What do you think?

1. Have you ever thrown an unwanted electronic device into the garbage? ○ Yes ○ No ○ Not sure

2. Are you aware of recycling options in your local area? ○ Yes ○ No ○ Not sure

3. Would you be willing to pay a $10 recycling fee for any electronic product you purchase? ○ Yes ○ No ○ Not sure

4. Do you think that national recycling laws are needed? ○ Yes ○ No ○ Not sure

Save It!

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QuickCheck A

1. Traditionally, PCs and Macs have been distinguished as two different personal computer __________ .
2. True or false? To prepare yourself to evaluate the “deals” offered by computer merchants, you can create a table of current specifications in three price ranges. __________
3. True or false? Experts advise you to avoid purchasing a used computer, even though it might appear to be a very good deal. __________
4. For warranty service, you’ll need a copy of your __________ as proof of purchase date.
5. Computers and other electronic gear account for about __________ % of household energy use.

CheckIt!

QuickCheck B

Fill in the blanks to complete this computer ad:

- __________ Core 2 Duo Processor 2.8 GHz
- 800 __________ FSB
- 4 __________ SDRAM
- 500 GB __________
- 8X CD/DVD Burner
- 512 MB ATI Radeon __________ Card
- 16-inch HD WLED display
- Integrated Speakers and Subwoofer
- Integrated Webcam
- Wi-Fi and Bluetooth
- Microsoft Windows 7 Home Premium 64- __________
- Three-Year Service Plan

New!
Val-U-Point
Model P43200
Call Today!

CheckIt!

GetIt? While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 18.

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CHAPTER 19

Upgrading and Expanding Your PC

What's Inside?

When you purchased your PC, it was a top-of-the-line machine. A year later, it might seem a little past its prime. In Chapter 19, you'll find out how to give your "old" PC a makeover by upgrading its components or expanding its capabilities.

- **FAQs:**
  - Can I upgrade the processor in my PC? 271
  - Will adding RAM improve my PC's performance? 272
  - How do I add and upgrade external devices? 273
  - When do I need device drivers? 274
  - Should I upgrade to a new OS? 275
- **Hardware:** Desktop computers 276
- **Project:** Explore technical support 279
- **Issue:** What's wrong with a little dirt...or smoke? 282
- **QuickChecks** 283

What's on the CD?

Don't be shy about using a screwdriver on your PC. The videos in Chapter 19 show you how to install new chips, cards, and devices. Just remember that the person who disassembles a PC is also the person responsible for restoring it to working order!

- Learn how to install a replacement microprocessor 271
- Discover how easy it is to add RAM 272
- Find out everything about USB 273
- Learn how to check your device drivers 274
- Learn how to insert an expansion card 277

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FAQ Can I upgrade the processor in my PC?

Expanding your PC usually means adding components, such as a printer or scanner, that increase functionality. Upgrading typically means replacing a component, such as a microprocessor, with one that is newer and that provides enhanced performance. There are many options for expanding and upgrading your computer. Not every option is cost effective or suitable for your hardware, however. Some upgrades can potentially ruin your computer. Before you rush out and purchase the latest, greatest components, do your homework to discover if the benefits are worth the potential risk.

If your computer's microprocessor fails, it is a mid-level technical task to replace it with the same model. Even so, most computer owners leave this task to the professionals. Although it would seem like an easy way to get a quick performance boost and extend the life of an older-model computer, processor upgrades can be tricky.

A microprocessor plugs into a **CPU socket** of a computer's system board. CPU sockets are not universal and they are soldered permanently to the system board so you cannot change them. If you want to upgrade your computer's microprocessor, you have to replace it with one that fits in the existing CPU socket.

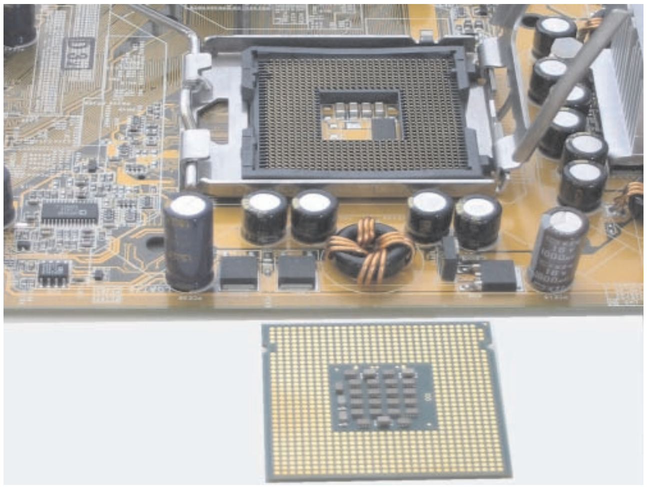
Practically speaking, microprocessor upgrades are not always such a good deal. Purchasing a slightly faster model of your current microprocessor can be relatively inexpensive—from US$50 to US$300—but it won't dramatically boost the speed at which your PC appears to operate. Upgrading several levels of speed to a state-of-the-art microprocessor will usually produce a noticeable speed increase, but is a much more expensive proposition that might cost as much as a new computer.

An alternative way to boost processor speed is to increase the clock rate of the microprocessor that is already in your computer. This popular technique, called **overclocking**, speeds up components so that they operate faster than the rate specified by the manufacturer. Overclocking your computer's processor involves changing the system settings and may require adjustments to the system voltage. Overclocking is very risky. Additional electrical power pumped into a component increases heat output. Overclocked components can overheat and increase the possibility of malfunctions.

Still thinking about speeding up your computer's processor? Click the Play It! button to see what's involved.

Play It!

Figure 19-1



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FAQ Will adding RAM improve my PC's performance?

Adding RAM to your PC can increase processing efficiency by providing more fast-access space for programs and data. Whenever your PC is on, RAM holds parts of the operating system, the software program modules you're currently using, and as much data as possible for the files you have open. With more RAM, larger sections of the programs and data you work with can be held in memory circuits, instead of remaining on disk. The processor works more quickly if it can access program instructions and data without waiting for them to arrive from disk storage.

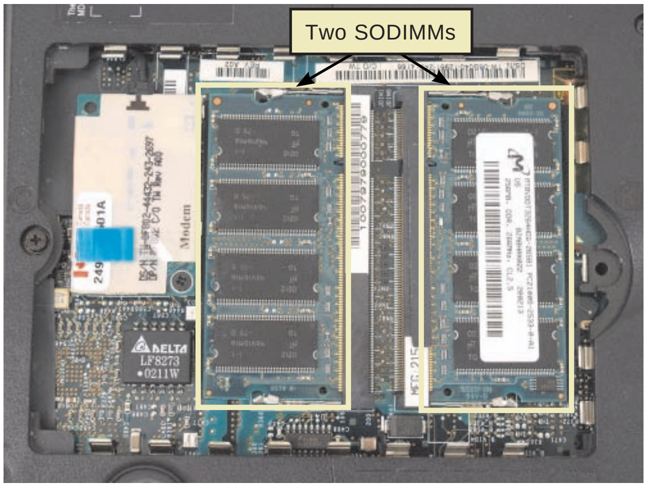
Today's PCs typically have at least 2 GB of RAM. Adding RAM is fairly inexpensive, with each GB of memory costing less than US$50. Before you add RAM, check the current RAM capacity of your PC by typing "RAM" in the Start menu's Search box. Next, refer to the documentation for your PC to find the maximum RAM capacity. You can add memory only up to this limit. The documentation should also specify the type of RAM that you should purchase. RAM specifications include speed, capacity, package, type, and pins.

- **Speed.** Memory access time is measured in nanoseconds (ns) or megahertz (MHz). Lower nanoseconds offer faster data availability. For example, 50 ns RAM is faster than 70 ns RAM. Higher megahertz offer faster speeds: 700 MHz RAM is faster than 675 MHz RAM.
- **Capacity.** Measured in gigabytes, capacity refers to the amount of data that each memory module can hold. Memory modules are typically available in increments of 1, 2, or 4 GB.
- **Package.** RAM chips are packaged onto memory modules such as **DIMMs** (dual in-line memory modules) or **SODIMMs** (small outline dual in-line memory modules).
- **Type.** The memory modules in today's PCs typically contain **DRAM** (dynamic RAM) chips, which require a constant supply of power to refresh the data that they hold. DRAM comes in several types, including SDRAM and DDR RAM.
- **Pins.** RAM modules have metallic edges that slide into a slot on the system board. The slots in your computer will accept only memory modules with the correct number of pins on the module's metallic edge.

Adding RAM is one of the least expensive and most effective ways to increase the performance of your PC. Click the Play It! button to find out how to install RAM modules.

Play It!

Figure 19-2



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FAQ How do I add and upgrade external devices?

The input, output, and storage devices for computers are sometimes referred to as **peripheral devices**. Most of these devices are designed to connect to USB ports. USB technology offers fast, dependable data transport. The current USB 2.0 Hi-Speed standard carries data at speeds up to 480 Mbps, which is fast enough for hard drive and camcorder data. USB 3.0 carries data at about 3 Gbps.

Installing a USB device is simple—just plug the cable for the device into a USB port. Your computer automatically recognizes the new device and, if necessary, guides you through the process of installing any software necessary for the device to communicate with the computer.

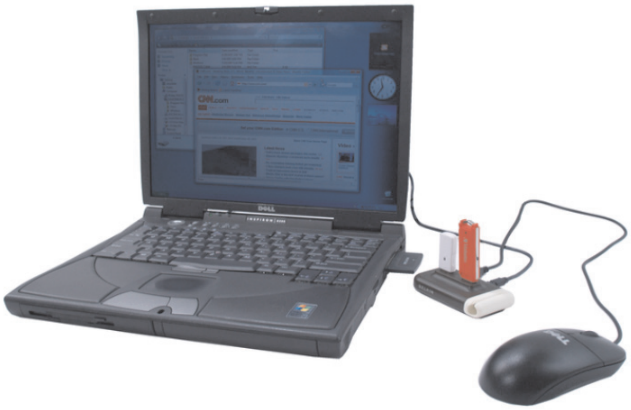
If you want to connect more devices than the available number of USB ports, you can use USB hubs. A **USB hub** is an inexpensive device that turns one USB port into multiple ports. It also saves wear and tear on USB ports caused by repeatedly inserting and removing USB devices. When connecting low-power devices—such as a mouse, keyboard, or flash drive—you can use a **bus-powered hub** that draws all its power from the computer. For devices such as printers and external hard disk drives that draw more power, a **self-powered hub** plugs into an external power supply.

Some USB devices don't even need a cable. **Wireless USB** (WUSB) operates by transmitting data from a wireless transceiver in your computer to a similar transceiver on a Wireless USB device. Some computers include built-in Wireless USB. For other computers, Wireless USB capability can be added by connecting a Wireless USB hub.

USB is the most popular way to connect external devices to your computer. Click the Play It! button to learn more about USB plugs and ports, installing USB devices, working with USB hubs, and installing a Wireless USB hub.

PlayIt!

Figure 19-3



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FAQ When do I need device drivers?

A **device driver** is software that helps a peripheral device establish communication with a computer. This type of system software is used by printers, display devices, graphics cards, sound cards, network cards, modems, storage devices, mice, and scanners. Device drivers work directly with a computer's operating system and they work best when designed for the operating system installed in your computer.

Windows 7 includes built-in device drivers for many peripheral devices. When you connect a new peripheral device, Windows looks for an appropriate built-in driver. If one is not found, you'll be prompted to insert the driver disc supplied by the peripheral device manufacturer.

Once installed, a device driver automatically starts when it is needed. Because device drivers usually run in the background without opening a window on the screen, it is easy to forget they exist—until something goes wrong and a peripheral device stops working.

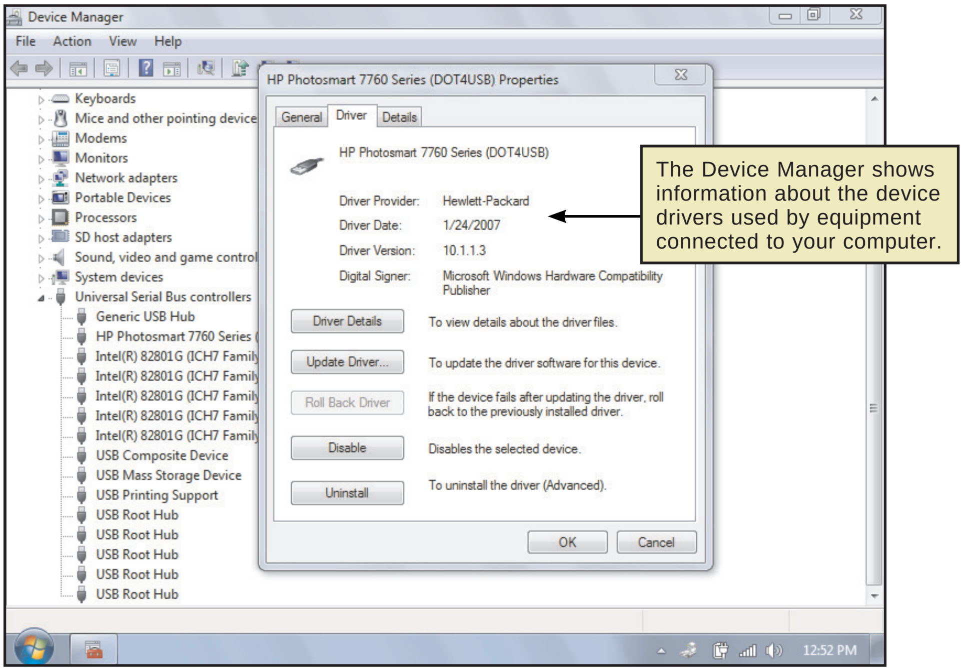
Device drivers can fail for a variety of reasons. They can become corrupted by a momentary hard drive malfunction. Occasionally, conflicts from other devices or software applications can cause a device driver glitch. Sometimes the automatic updates for your computer's operating system cause a driver meltdown.

Most device manufacturers are aware of problems created by operating system updates and revise device drivers as necessary. Device drivers are also revised to enhance performance. Device manufacturers typically post device driver updates in the service and support areas of their Web sites. If you're having trouble with a peripheral device—especially if the device was previously working—check for a driver update. You might also check for driver updates before installing new devices. Often the discs supplied with new equipment contain old versions of device drivers. If a newer version is available, most experts recommend that you use it.

Windows 7 can be configured to automatically check for device driver updates. If you prefer to maintain your drivers manually, you can use the Windows Device Manager. Click the Try It! button to learn more.

Try It!

Figure 19-4


Device Manager
File
Action
View
Help
Keyboards
Mice and other pointing device
Modems
Monitors
Network adapters
Portable Devices
Processors
SD host adapters
Sound, video and game control
System devices
Universal Serial Bus controllers
Generic USB Hub
HP Photosmart 7760 Series (
Intel(R) 82801G (ICH7 Family
Intel(R) 82801G (ICH7 Family
Intel(R) 82801G (ICH7 Family
Intel(R) 82801G (ICH7 Family
Intel(R) 82801G (ICH7 Family
USB Composite Device
USB Mass Storage Device
USB Printing Support
USB Root Hub
USB Root Hub
USB Root Hub
USB Root Hub
USB Root Hub
HP Photosmart 7760 Series (DOT4USB) Properties
General
Driver
Details
Driver Details
Update Driver...
Roll Back Driver
Disable
Uninstall
OK
Cancel
12:52 PM

HP Photosmart 7760 Series (DOT4USB)

Driver Provider: Hewlett-Packard
Driver Date: 1/24/2007
Driver Version: 10.1.1.3
Digital Signer: Microsoft Windows Hardware Compatibility Publisher

To view details about the driver files.
To update the driver software for this device.
If the device fails after updating the driver, roll back to the previously installed driver.
Disables the selected device.
To uninstall the driver (Advanced).

The Device Manager shows information about the device drivers used by equipment connected to your computer.

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FAQ Should I upgrade to a new OS?

Upgrading to a new version of the operating system can give your computer a performance boost and a new OS might very well offer better security. For the modest price of an upgrade, you may feel like you've got a new computer.

In general, you can easily upgrade from the previous operating system generation, but an upgrade might be a little more work if you skip generations. For example, you can easily upgrade from Windows Vista to Windows 7, but the upgrade from Windows XP is a bit more difficult. If your current operating system is not eligible for an upgrade, you might be able to install a new operating system by performing a clean install, which reformats your hard disk and forces you to reinstall your applications and data files.

When performing an operating system upgrade, consider the following suggestions:

Check specifications. Verify that your computer meets the processor, memory, and disk space specifications for the new operating system.

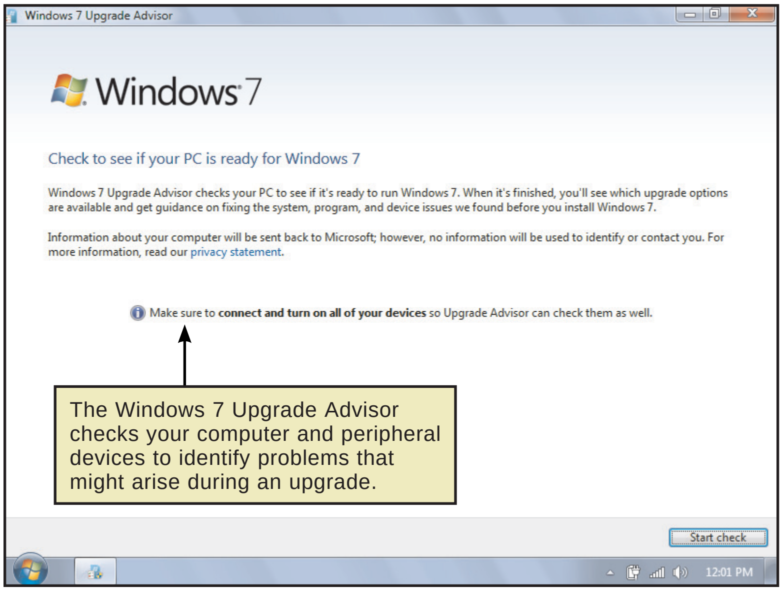
Back up your files. Make sure you have a current backup of your entire hard disk stored on an external hard drive.

Research the process. Check online to get tips about the upgrade process, and warnings of possible pitfalls or glitches. Some older peripheral devices and built-in networking might not be supported by new operating systems, or you might have to download new device driver software to get older peripheral devices to work; it is useful to know about such potential problems before the upgrade begins.

Gather tools. Find out if the operating system publisher offers any tools to assist you with the upgrade. For example, Microsoft supplies a tool called the Windows 7 Upgrade Advisor that tells you whether your computer's hardware and software will work under Windows 7. Microsoft also supplies Easy Transfer software that helps you back up the programs and files you want to transfer back to your computer once the new operating system has been installed.

Make sure you have time. Your computer will be out of commission during the upgrade process, which can last for several hours. Leave yourself time to perform the upgrade and allocate some extra time for troubleshooting.

Figure 19-5



Check to see if your PC is ready for Windows 7

Windows 7 Upgrade Advisor checks your PC to see if it's ready to run Windows 7. When it's finished, you'll see which upgrade options are available and get guidance on fixing the system, program, and device issues we found before you install Windows 7.

Information about your computer will be sent back to Microsoft; however, no information will be used to identify or contact you. For more information, read our privacy statement.

Make sure to **connect and turn on all of your devices** so Upgrade Advisor can check them as well.

The Windows 7 Upgrade Advisor checks your computer and peripheral devices to identify problems that might arise during an upgrade.

Hardware

Desktop computers

Desktop computers might seem like the dinosaurs of the digital millennium. Who wants a bulky, multi-component desktop computer when you can have a sleek all-in-one notebook that's easy to tote about and runs on battery power if there's no nearby outlet or if the power is out?

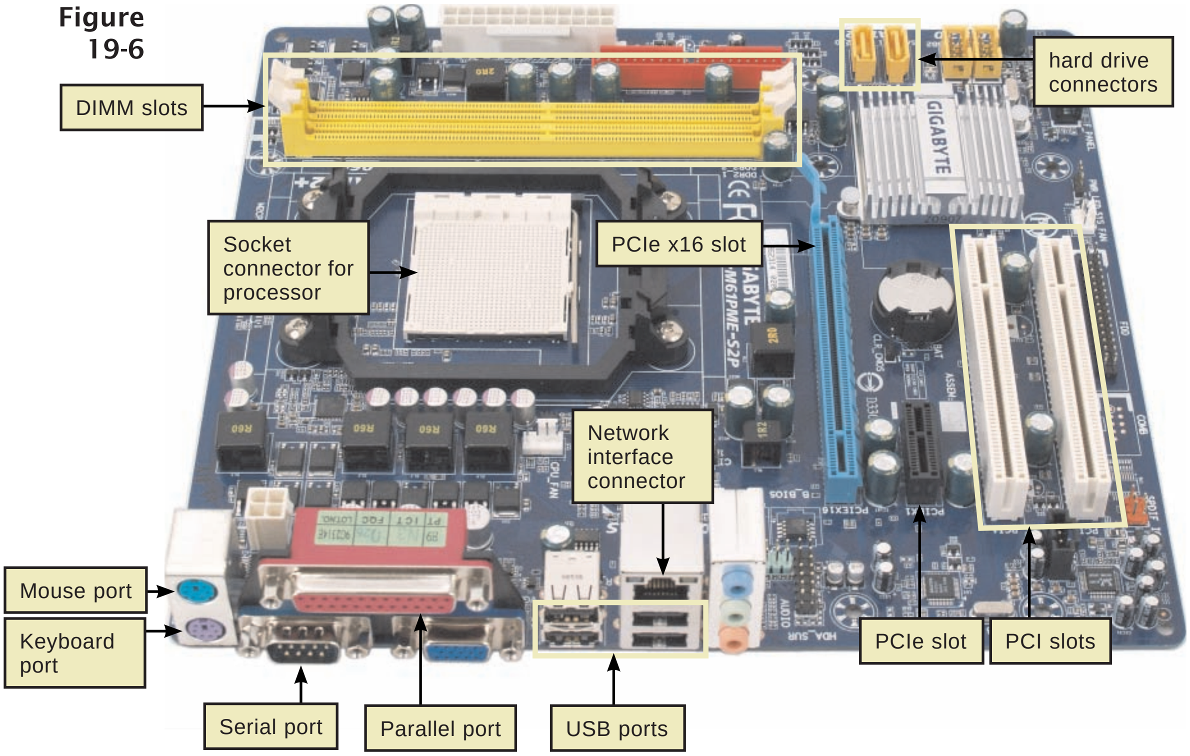
Desktops are not dead yet. Gamers and modders love their flexibility; desktops can be easily expanded and customized. In multi-computer households, desktops can play a crucial role as a file server and backup device.

Desktop computers typically have large cases. Yes, they are big and bulky, but that means there's space inside for lots of components, such as additional hard disk drives and blazing fast graphics cards. Notebook computer owners are generally limited to USB ports for connecting peripheral devices. Desktop computers offer an array of expansion options, including high-speed connectors that move data much faster than USB speeds.

All PCs have an expansion bus that provides a variety of ways to connect peripheral devices. An **expansion bus** is an electronic pathway that moves information between the microprocessor and RAM, and stretches to various ports and slots where data can be transferred to other electronic circuitry and devices. In many ways, an expansion bus is analogous to the transit system within an airport that transports people to different airline terminals where they can board flights.

Where the expansion bus leads to connection points that can be accessed outside the system unit, it produces expansion ports, such as USB ports. Connectors inside the case are called **expansion slots**. Whereas notebook computers typically have one or two expansion slots dedicated to expanding RAM, desktop computer system boards like the one in Figure 19-6 also offer **PCI Express** (PCIe) expansion slots that can be used for a wide variety of devices.

Figure 19-6



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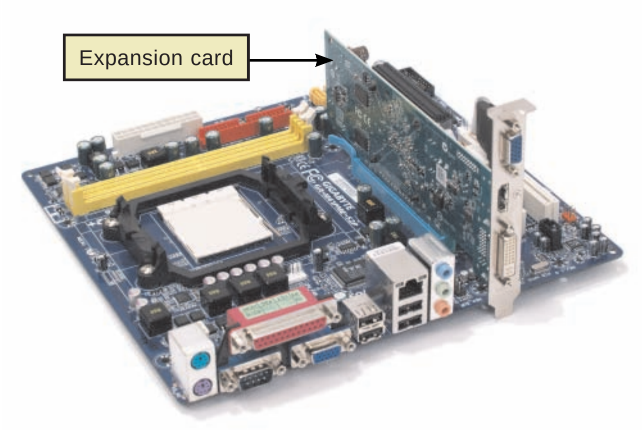
Hardware
(continued)

Expansion slots are designed to accept circuit boards called expansion cards. An **expansion card** contains circuitry for a device such as a modem, network card, storage device controller, or graphics card. When an expansion card is inserted in a slot, electronic signals representing data can flow from the card to the processor or RAM. Click the Play It! button to find out how to correctly remove, insert, and secure expansion cards.

Play It!

Figure 19-7



The most common use of expansion slots is to upgrade a PC's graphics capability. You can easily swap out a graphics card from a desktop computer and replace it with a new one containing lots of video RAM and accelerated graphics capabilities for fast gaming and artistic rendering. In contrast, the graphics circuitry in most notebook computers is integrated into the system board and cannot be upgraded.

Another useful way to populate your desktop computer's PCIe slots is with a RAID controller. **RAID** originally was the acronym for "redundant array of inexpensive disks." Today, the term is used to describe a variety of techniques that divide and replicate data among multiple hard disk drives.

A RAID array contains several disk drives, but they appear to the operating system as one single storage device. Within the array, data can be **mirrored** onto more than one disk, which can improve the speed of data access and protect data in case one of the disks in the array fails. The RAID controller that plugs into a PCIe slot is a circuit board that controls all of the drives in the RAID array.

RAID storage is a popular feature of business and home server systems. In businesses, these servers are often dedicated Web servers, database servers, and file servers. In a home network, a desktop computer can perform an important role as a depot for shared files and a backup location for files from your notebook computer's hard disk. A desktop computer is perfect for this job; you'll rarely want to move it, and you'll appreciate its expandability.

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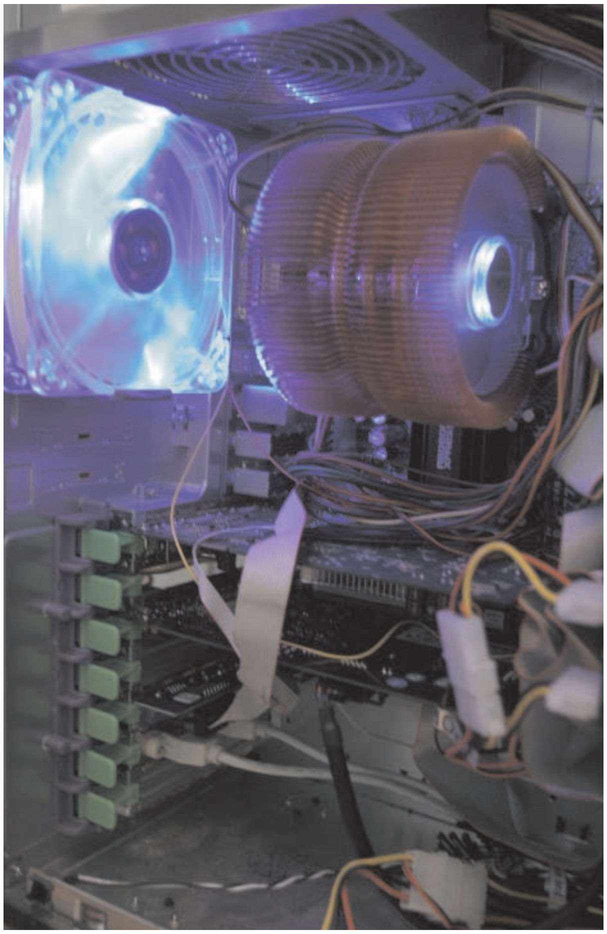
Hardware
(continued)

The upgrades and accessories that you've learned about are usually sanctioned and approved by computer manufacturers and vendors. However, some creative computer owners, called modders, work with unsanctioned modifications. A **computer mod** is a custom, hand-built modification to a computer system component.

Modding is a fun way to learn about computers and discover literally what makes them tick. Modders who experiment with overclocking learn a lot about how processors work as they try to crank up the flow of data without frying delicate circuits.

Mods are analogous to hot rods in many ways. Just as hot rod construction begins with a standard car chassis, a computer mod begins with standard, off-the-shelf components. Hot rods can be chopped, jacked, and painted with wild colors; their fenders can be removed, windows added, and engines chromed. Computer mods often include custom paint jobs, glowing lights, state-of-the-art components, and clear Plexiglas side panels that offer a view of the system board.

Figure 19-8



Courtesy Paul Williams Creative Commons Attribution

Modders have built computers using discarded microwave ovens, vintage televisions, gumball machines, LEGOs, suitcases, and toys—all items that can be picked up in thrift stores or at rummage sales. Modders who are not into shabby chic can begin with a futuristic "extreme" desktop case, available from a variety of vendors, that is tricked out with see-through panels and lighted interiors.

Basic gear for mods also includes heavy-duty power supplies, plus ventilation and cooling systems designed to keep overclocked components cool. Hard core modders even use liquid cooling systems for maximum chill.

Electronic components, such as cold cathode lights and neon string lights, can be scavenged from a variety of sources. Modder Web sites offer an extensive selection of components and advice.

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Project

Explore technical support

When hardware installations go smoothly, upgrading your PC is the proverbial "piece of cake." Unfortunately, you might encounter problems while attempting to install a new peripheral device, or the new device might function properly for months and then suddenly stop working. Where can you turn for technical support?

Hardware manufacturers and software publishers typically provide a phone number or e-mail address for contacting their technical support. However, they recommend that you first explore their Web sites, where they provide solutions to common problems.

When you have completed the project, you should be able to:

- Use Microsoft's support site to troubleshoot operating system problems.
- Access user forums for solutions to hardware and software problems.
- Use Google to search for solutions to software and hardware problems.

Requirements: This project requires Microsoft Windows 7, word processing software, a browser, and Paint.

The deliverable for Project 19 is a document containing the following:

1. A copy of the suggested solution for a computer that doesn't generate sound
2. A screenshot of the Playing Audio troubleshooter
3. A copy of the results for "Dell Control Panel not responding"
4. Your findings from a Google search for "Dell Control Panel not responding"
5. Your findings for problems A, B, and C in Step 10

1. The Windows 7 Help & How-to Web site provides a wealth of information, including help for using various features and instructions for troubleshooting hardware or software problems. To access the site, open your browser, type **windows.microsoft.com/en-US/windows7/help** in the address bar, and press the Enter key. The Web site's main page is displayed.

2. Suppose you insert a music CD into your computer, but you don't hear any sound. To start troubleshooting the problem, click the Top Solutions link at the top of the page. Click the *Music and sound* link, then select the link *Tips for fixing common sound problems*. A list of common problems is displayed.

3. Browse through the problems list and select *I can't hear any sound from my computer*. Review the solution provided. Copy the main paragraphs of the solution and paste them into a blank word processing document.

4. Follow the instructions for starting the Playing Audio troubleshooter. Take a screenshot of the results and paste the shot into your document for this project.

5. Click the Back button to return to the Top Solutions page. You can also look for solutions in user forums. Click the *Community & forums* link, then click Windows 7 Forums. Enter **No sound** in the search box. Click one of the results and browse through the discussion thread to get an idea of how these user forums work.

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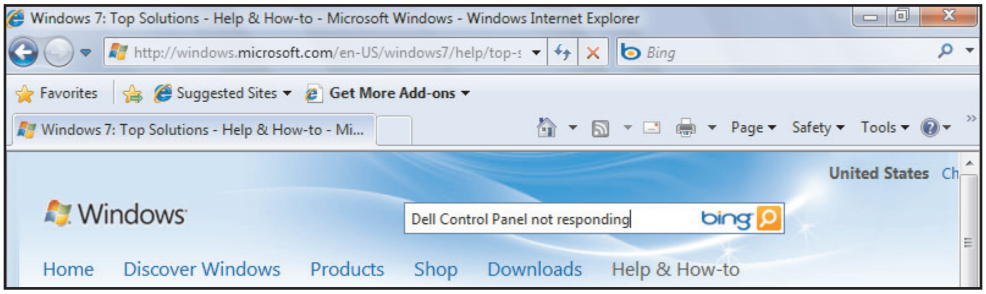
• Explore technical support (continued)

6. Use your browser's Back button to return to the Top Solutions page. Now suppose that you're using a Dell laptop and you've encountered a persistent problem. The first time you try to open the Control Panel during a session, you get a "program not responding" message. After you close the Control Panel window, it seems to work properly the next time you start it. Browse through the top issues to see if you can find a solution.

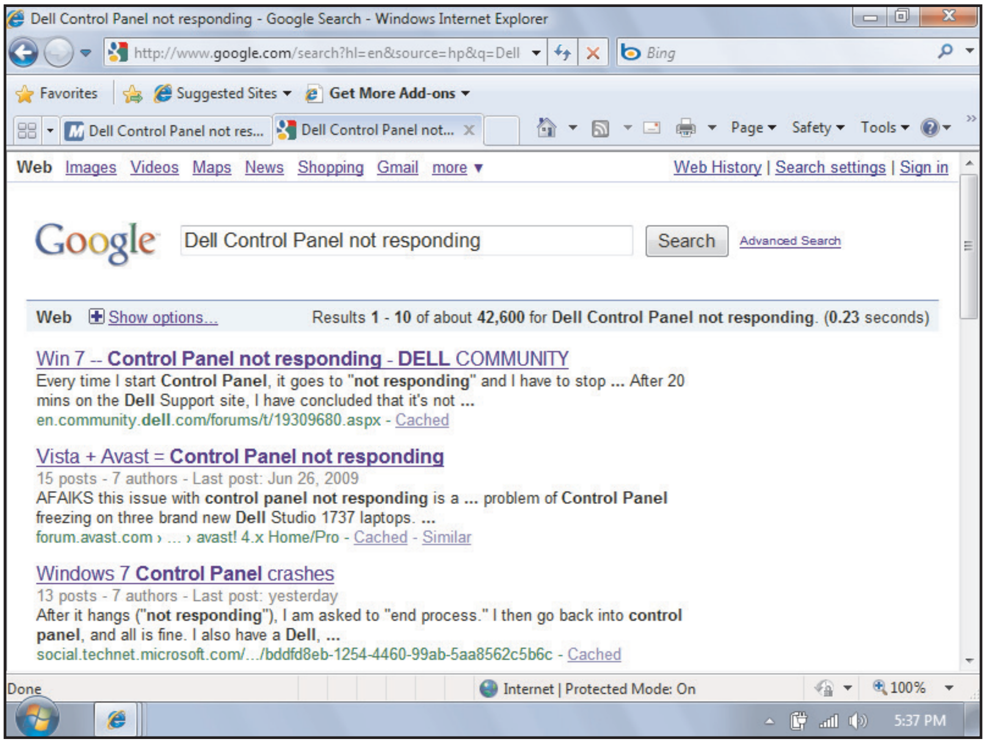
7. For answers to specific questions, you can use the Bing Search bar near the top of the page. Enter **Dell Control Panel not responding**. Copy the results into your document for this project.


Windows 7: Top Solutions - Help & How-to - Microsoft Windows - Windows Internet Explorer
http://windows.microsoft.com/en-US/windows7/help/top-s
Bing
Favorites
Suggested Sites
Get More Add-ons
Windows 7: Top Solutions - Help & How-to - Mi...
Page
Safety
Tools
United States
Ch
Windows
bing
Home
Discover Windows
Products
Shop
Downloads
Help & How-to

Dell Control Panel not responding

8. You can expand your search to the entire Microsoft site. Click the *Search all of Microsoft.com* link on the right side of the page. Do any of the links lead to a definitive answer?

9. Let's try one more way to solve the Control Panel problem. Use Google to search the Web for Dell Control Panel not responding. Record your findings. If you find a solution, copy it to your document for this project.


Dell Control Panel not responding - Google Search - Windows Internet Explorer
http://www.google.com/search?hl=en&source=hp&q=Dell
Bing
Favorites
Suggested Sites
Get More Add-ons
Dell Control Panel not res...
Dell Control Panel not...
Page
Safety
Tools
Web
Images
Videos
Maps
News
Shopping
Gmail
more ▾
Web History | Search settings | Sign in
Google
Search
Advanced Search
Web
Show options...
Done
Internet | Protected Mode: On
100%
5:37 PM

Dell Control Panel not responding

Results **1** - **10** of about **42,600** for **Dell Control Panel not responding**. (**0.23** seconds)

Win 7 -- **Control Panel not responding** - **DELL** COMMUNITY
Every time I start **Control Panel**, it goes to "**not responding**" and I have to stop ... After 20 mins on the **Dell** Support site, I have concluded that it's not ...
en.community.**dell**.com/forums/t/19309680.aspx - Cached

Vista + Avast = **Control Panel not responding**
15 posts - 7 authors - Last post: Jun 26, 2009
AFAIKS this issue with **control panel not responding** is a ... problem of **Control Panel** freezing on three brand new **Dell** Studio 1737 laptops. ...
forum.avast.com › ... › avast! 4.x Home/Pro - Cached - Similar

Windows 7 **Control Panel** crashes
13 posts - 7 authors - Last post: yesterday
After it hangs ("**not responding**"), I am asked to "end process." I then go back into **control panel**, and all is fine. I also have a **Dell**, ...
social.technet.microsoft.com/.../bddfd8eb-1254-4460-99ab-5aa8562c5b6c - Cached

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• Explore technical support (continued)

10. So you see that you can look for solutions by searching the support knowledge base at the Web site of a hardware manufacturer or software publisher. You can also check user forums or search for answers using Google. Now, let's see how good your sleuthing skills are. Look for solutions to the following problems. Copy and paste your findings into the document you've created for this project.

    Problem A: You've purchased a new computer with Windows 7, but it does not include a device driver for your old Hewlett-Packard 1210 LaserJet printer.

    Problem B: You have a Toshiba laptop running Windows 7. When you try to view YouTube videos in full screen mode, the screen shows just black and white rectangles.

    Problem C: You have a Lenovo notebook computer running Windows 7 and the latest version of iTunes. Although your music files play normally, your iTunes video files play, but there is no sound.

11. Save the document for this project as **Project 19 [Your Name]**.

Issue

What's wrong with a little dirt...or smoke?

With the push toward universal electronic medical records, computing devices are moving ever closer to hospital patients. Computers may eventually be placed in every patient room, and that's good for health care, but potentially bad for patients' health.

Computer keyboards and fans collect and harbor viruses and bacteria that can make healthy people sick and can be potentially deadly for patients already in hospitals. The spread of worrisome drug-resistant superbugs has been linked to the increasing use of technology devices in hospitals. By simply touching an infected keyboard, a health care worker can pick up a superbug and spread it to patients.

But deadly bacteria are not the only hazardous substances that collect on and in personal computers. Most computers—notebooks as well as desktops—include an internal fan, designed to keep components cool. In some models, the fan doesn't run constantly; it only kicks in when the temperature exceeds a safe baseline.

The fan, of course, pulls air into the system unit. But what else gets sucked in? Dirt, dust, pet hair, pollen, and mold spores. Several Web sites are devoted to photos of incredibly gross computers that would be better tossed into a recycle bin than repaired. According to technicians who open many system cases each day, some computer interiors are literally coated with grime. Computers used by smokers can get particularly nasty as second-hand smoke is pulled into the unit, where it sticks in the nooks and crannies of chips and circuit boards.

Some technicians, citing the fact that nicotine is on OSHA's hazardous substances list, have refused to work on nicotine-encrusted computers. An iMac brought in for repair to an Apple Authorised Service Center was labeled a biohazard and returned to its owner without being repaired. Apple stands by its technicians, saying it will not force technicians to work on any equipment that could harm their health.

It sounds like a tempest in a teacup, but what about smokers whose computers are under warranty? If Apple technicians refuse to repair smoke-encrusted computers, how can consumers get the warranty service to which they are entitled? Although Apple has not declared a blanket ban on smoky computers, some industry watchers wonder if this issue is a case of overzealous smoker bashing or the emergence of a real problem.

What do you think?

1. Do you know if you have dirt buildup around your computer's fans (notebook) or inside the case (desktop)? ○ Yes ○ No ○ Not sure

2. Are computer repair technicians within their rights when they refuse to work on excessively dirty computers? ○ Yes ○ No ○ Not sure

3. If a company can deny warranty service to dirty computers, should that be explicitly stated in the warranty? ○ Yes ○ No ○ Not sure

Save It!

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QuickCheck A

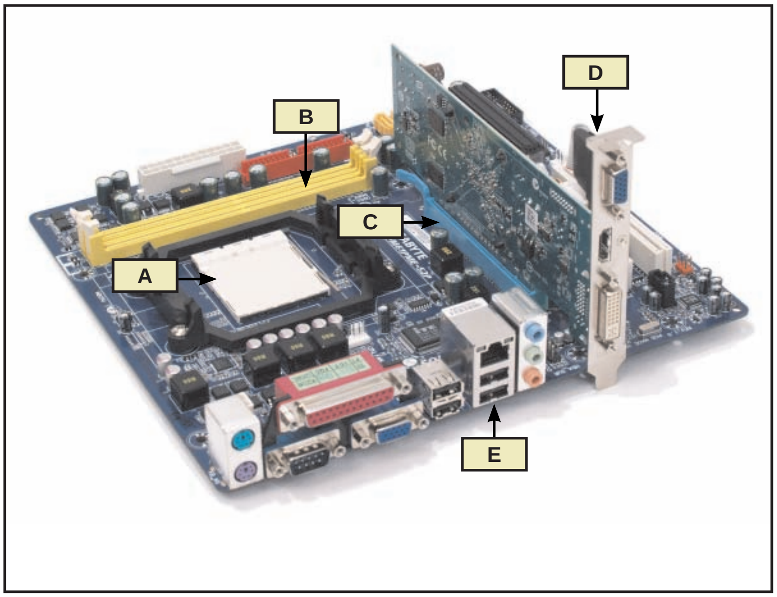
1. True or false? Upgrading your PC's microprocessor is the simplest and cheapest way to increase overall performance. ______
2. RAM is usually purchased as a(n) ______ or SODIMM package.
3. A(n) ______ -powered USB hub can be used for low-power devices, such as a mouse, keyboard, or flash drive.
4. You can use the Windows Device Manager to determine the status of the device ______ software for your printer.
5. PCIe slots are most typically used for graphics cards and ______ storage controllers.

CheckIt!

QuickCheck B

Indicate the letter of the component that correctly matches each of the following descriptions:

1. DIMM slot ______
2. PCIe slot ______
3. Expansion card ______
4. USB port ______
5. Microprocessor socket ______



CheckIt!

GetIt? While using the BookOnCD, click the Get It? button to see if you can answer ten randomly selected questions from Chapter 19.

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Practical PC, 6th Edition

CD-ROM System Requirements

- Windows® XP Home or Pro, Windows Vista, or Windows 7.
- At least SVGA or XGA Video with True Color Graphics at 1024x768 or higher.
- CD or DVD Drive for stand-alone systems.
- Mouse or similar pointing device.
- An SVGA or XGA Video card with High Color or True Color Graphics at 640x480 or higher (800x600 or 1024x764 recommended).
- To store Tracking data, a writable device such as a floppy disk, hard disk, CD/DVD burner, or USB Flash drive.
- A default Web browser such as Internet Explorer or Mozilla FireFox.
- A sound card properly configured to run WAVE and MIDI sound files is recommended.
- A default media player such as the Windows Media Player or QuickTime.
- An Internet connection with access allowed to www.mediatechnics.net and www.cengage.com.
- Users must have the following rights:
  - Write rights to whichever drive/device is to be used to save tracking data (could be hard drive, network drive, USB Flash drive, floppy drive, or CD/DVD burner).
  - Write rights to the Windows-defined Temporary Folder, typically c:\Documents and Settings\userID\Settings\Temp\ for Windows XP or c:\Users\UserID\AppData\Local\Temp for Windows Vista and Windows 7, but could have been configured to a different location.
  - Write rights to the Windows-defined Documents Folder, typically c:\Documents and Settings\userID\My Documents\ for Windows XP or c:\Users\UserID\Documents for Windows Vista and Windows 7, but could have been configured to a different location.

If students have Write rights to the Preferences Folder, typically c:\Documents and Settings\userID\Application Data\ for Windows XP or c:\Users\UsersID\AppData\Roaming for Windows Vista and Windows 7, the pointer to "last-used" tracking file will be saved in the Preferences Folder (as is the preferred practice). If they don't have Write rights to the Preferences Folder (as under an XP Limited User Account), that pointer will be written to the Documents Folder.

Refer to the Before You Begin section of this book or the Readme file on the CD for more specific system requirements and additional technical information.

NO INSTALLATION NECESSARY TO RUN THE CD